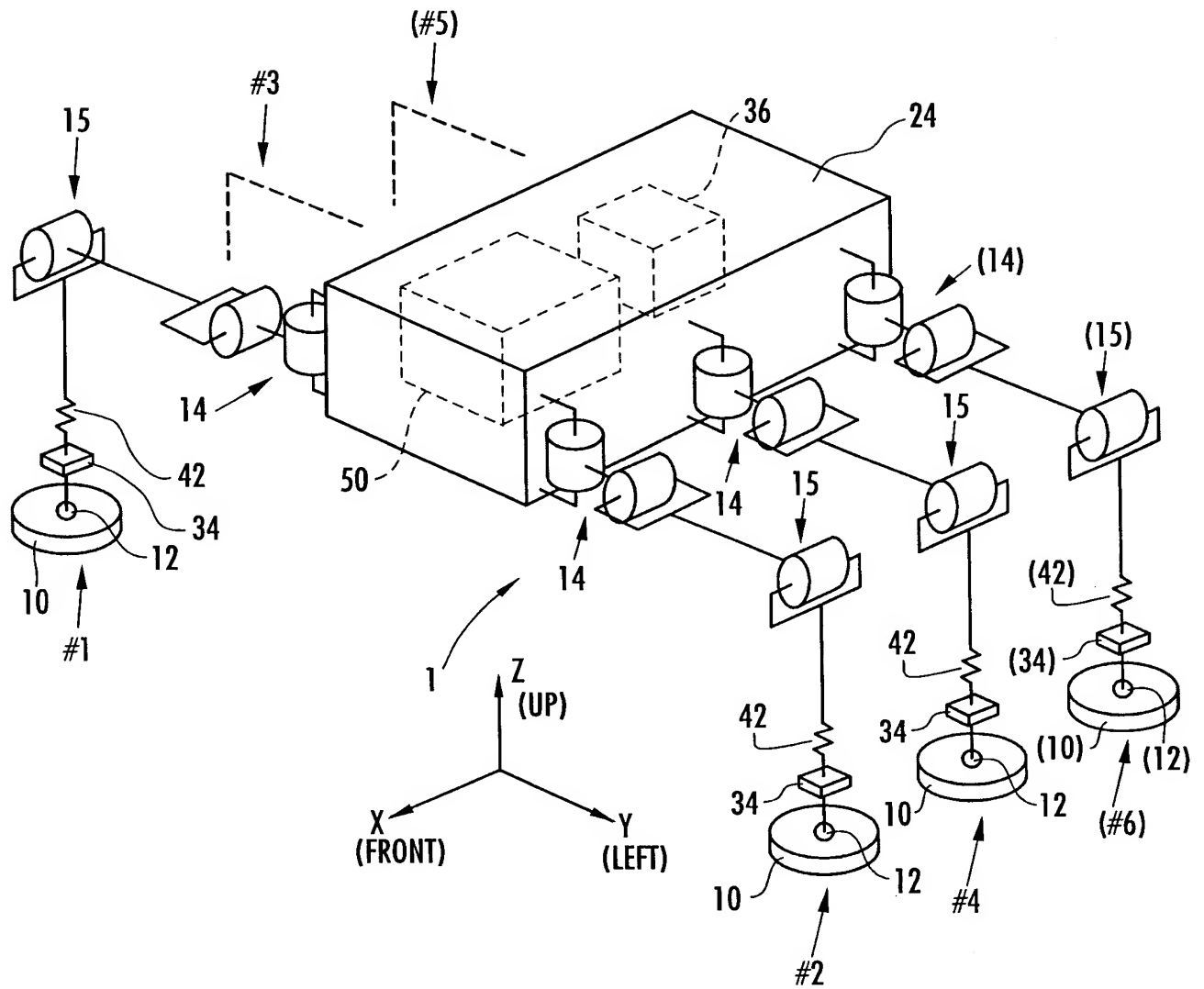


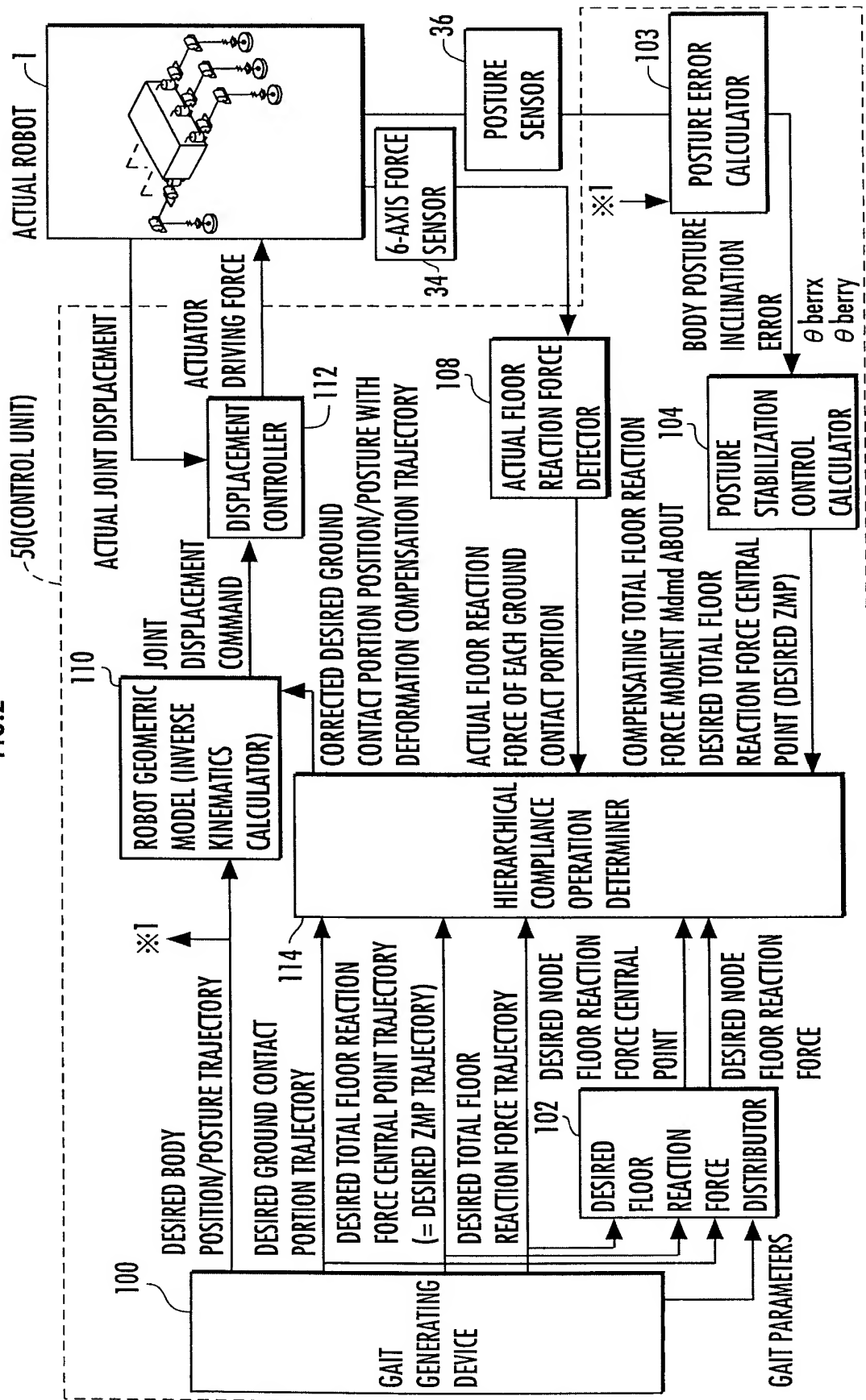
1 / 55

FIG.1



2 / 55

FIG.2



3 / 55

FIG.3(a)

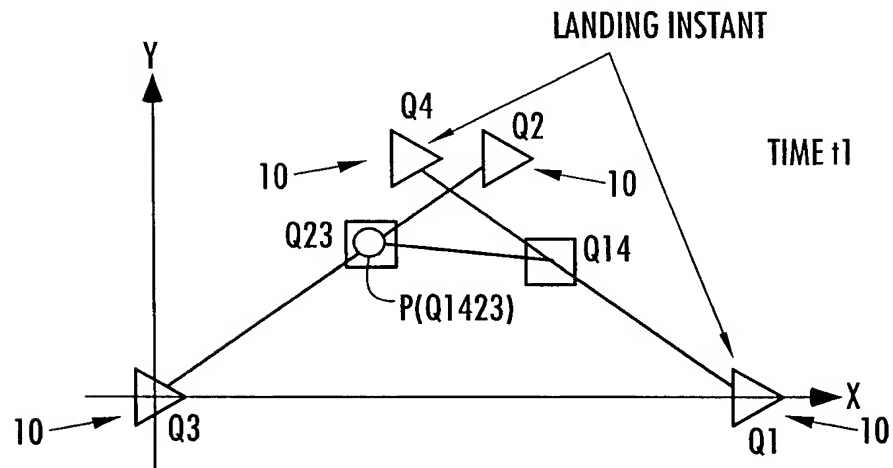


FIG.3(b)

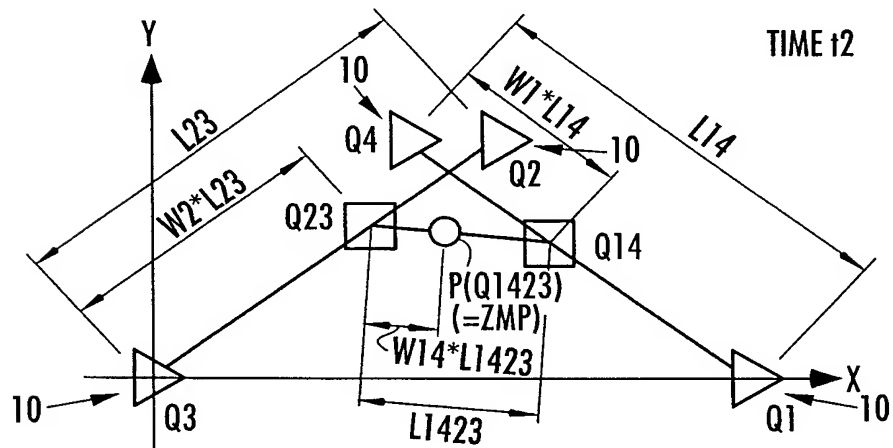
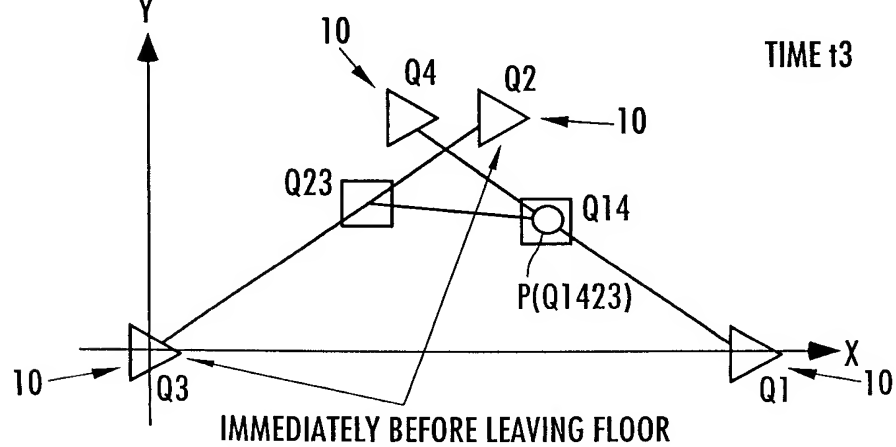


FIG.3(c)



4 / 55

FIG.4(a)

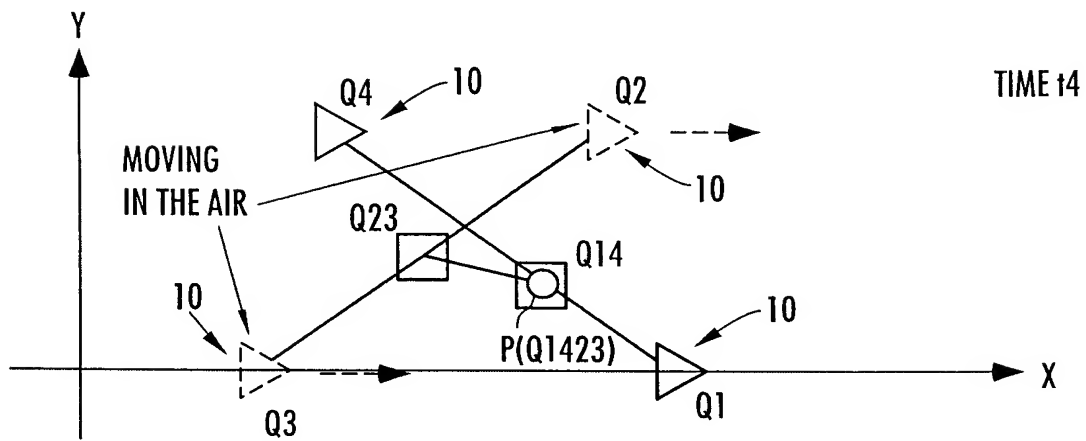


FIG.4(b)

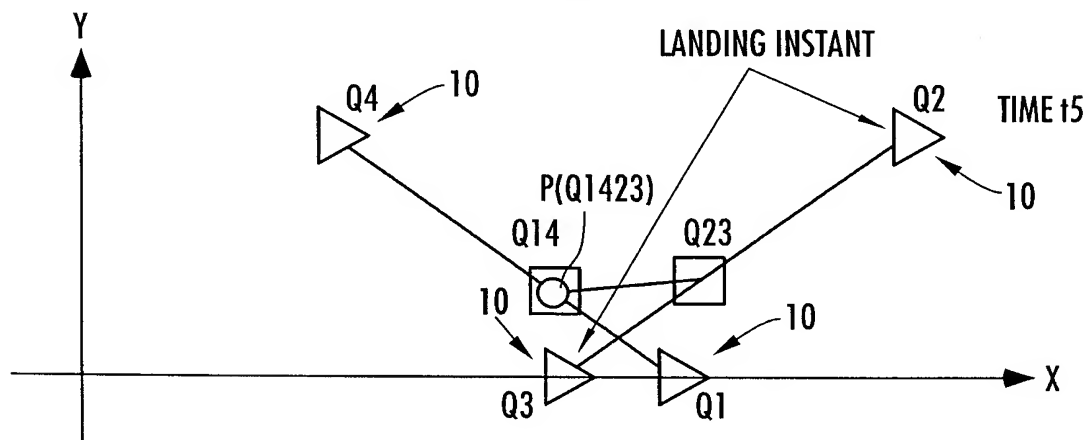
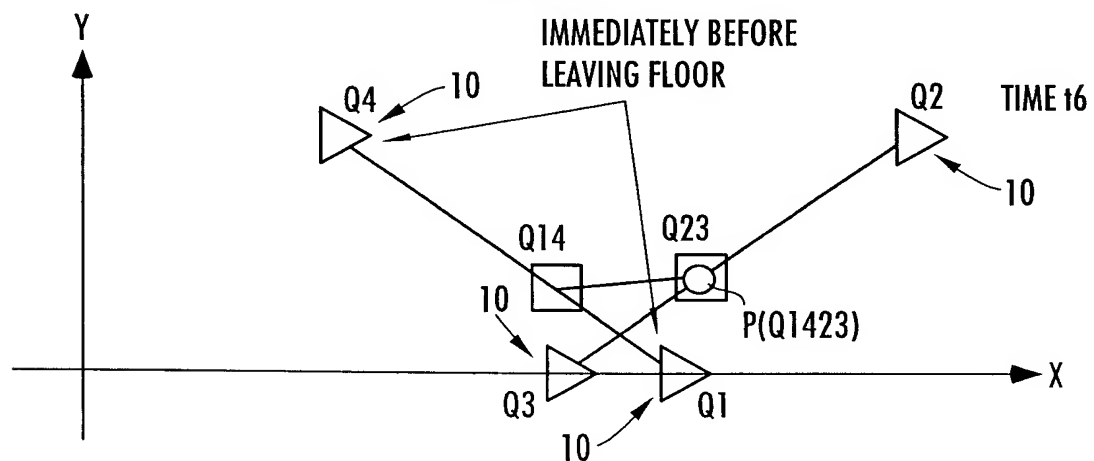


FIG.4(c)



5 / 55

FIG.5(a)

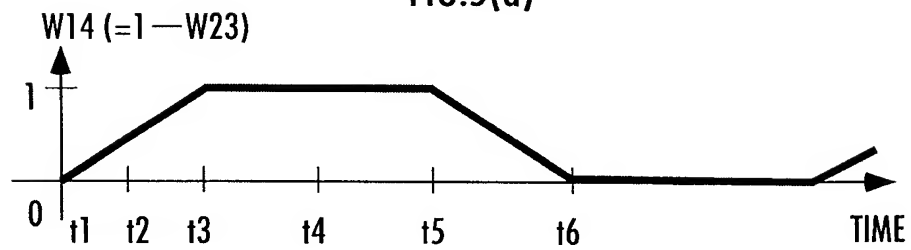


FIG.5(b)

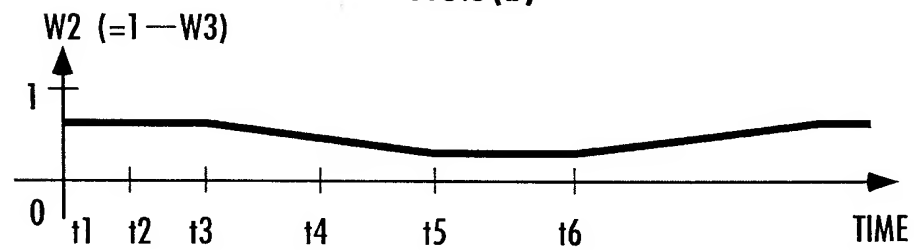


FIG.5(c)

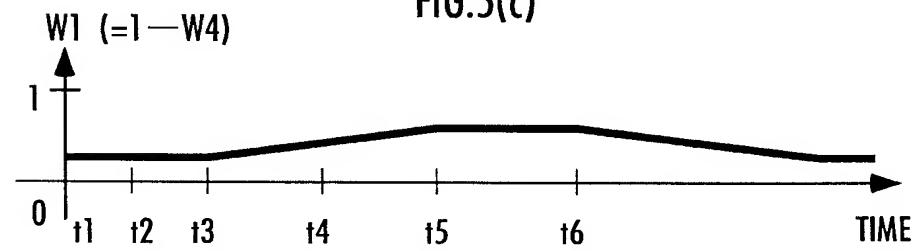
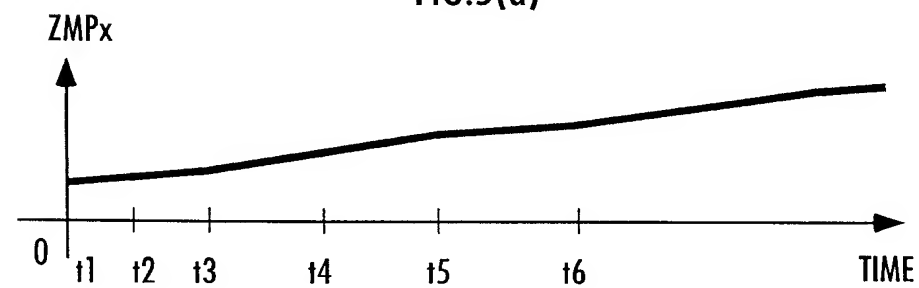


FIG.5(d)



6 / 55

FIG.6

1423RD NODE

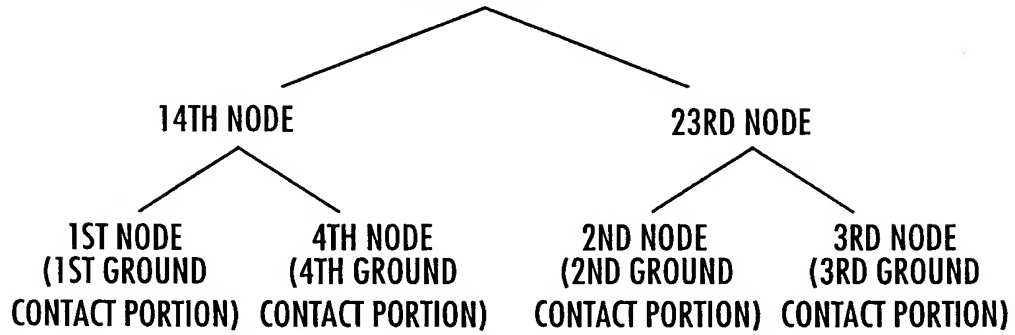
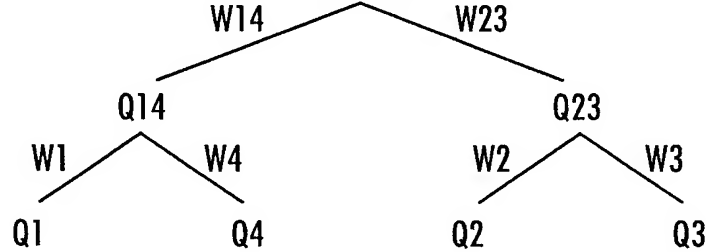


FIG.7

Q1423(=P)



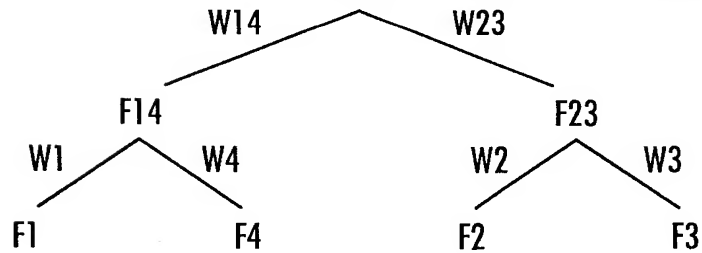
$$Q14 = W1 \cdot Q1 + W4 \cdot Q4$$

$$Q23 = W2 \cdot Q2 + W3 \cdot Q3$$

$$Q1423 = W14 \cdot Q14 + W23 \cdot Q23$$

FIG.8

F1423(=DESIRED TOTAL FLOOR REACTION FORCE  $F_{totalref}$ )



$$F1 = W1 \cdot W14 \cdot F_{totalref}$$

$$F4 = W4 \cdot W14 \cdot F_{totalref}$$

$$F2 = W2 \cdot W23 \cdot F_{totalref}$$

$$F3 = W3 \cdot W23 \cdot F_{totalref}$$

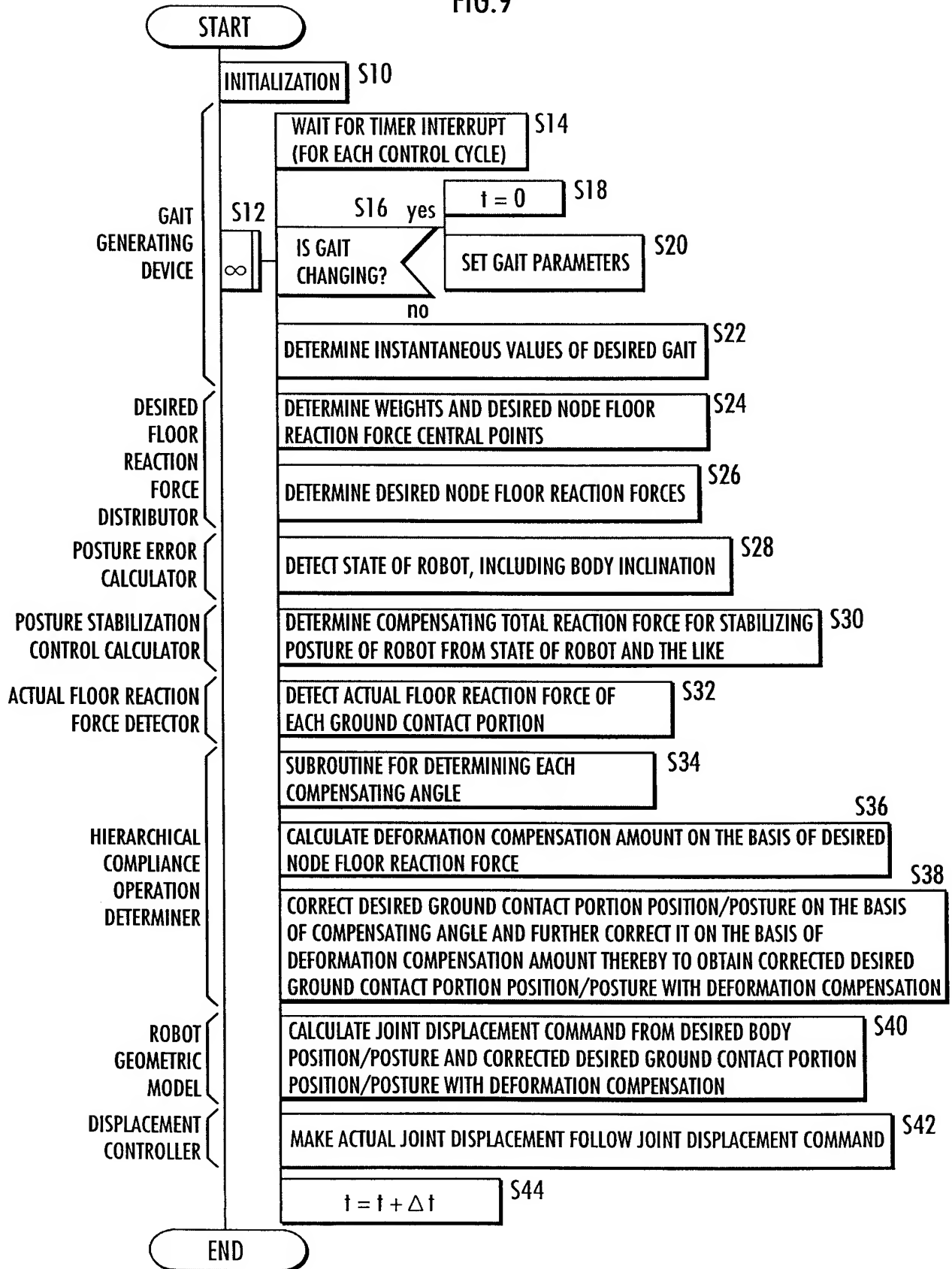
$$F14 = F1 + F4$$

$$F23 = F2 + F3$$

$$F1423 = F14 + F23$$

7 / 55

FIG.9



8 / 55

FIG.10

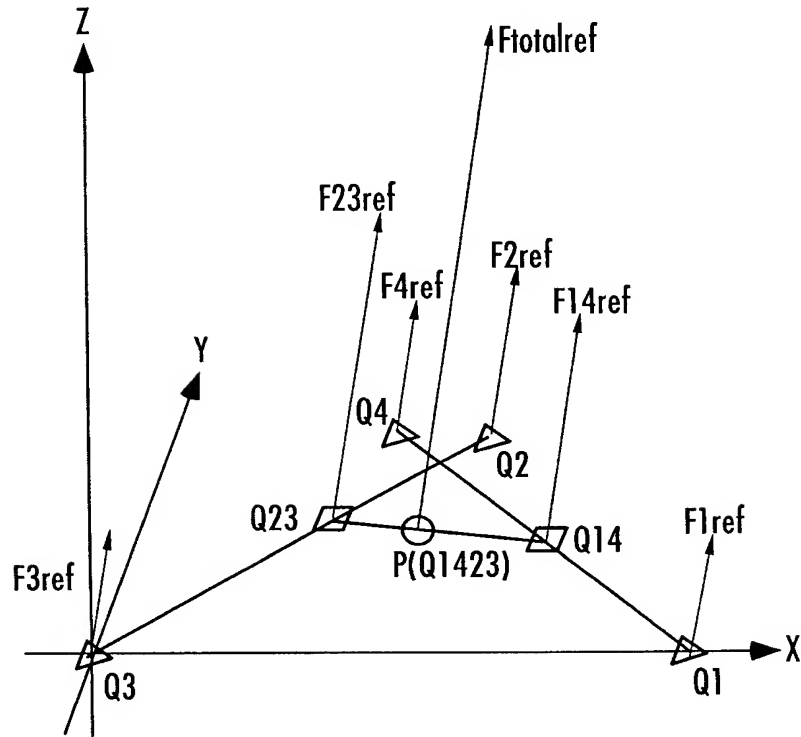
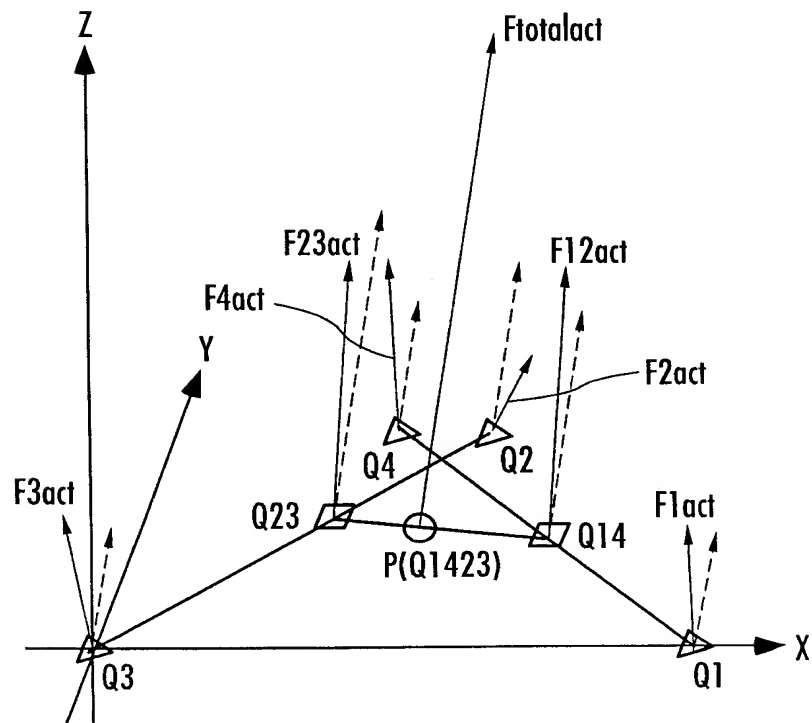


FIG.11





9 / 55

FIG.12

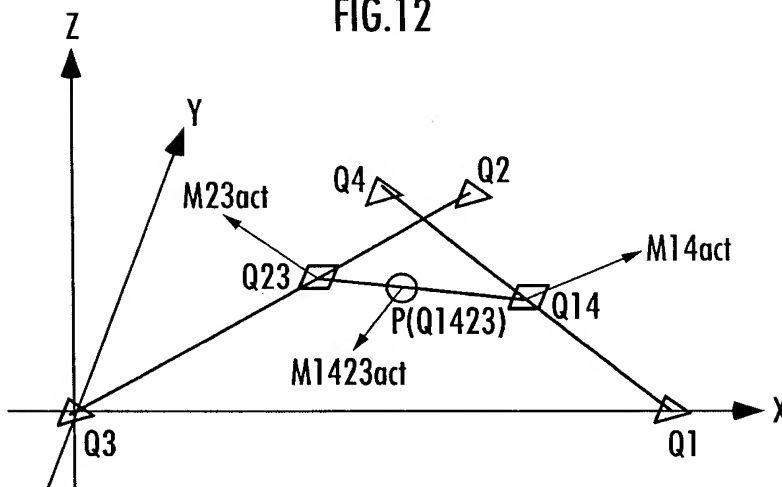


FIG.13

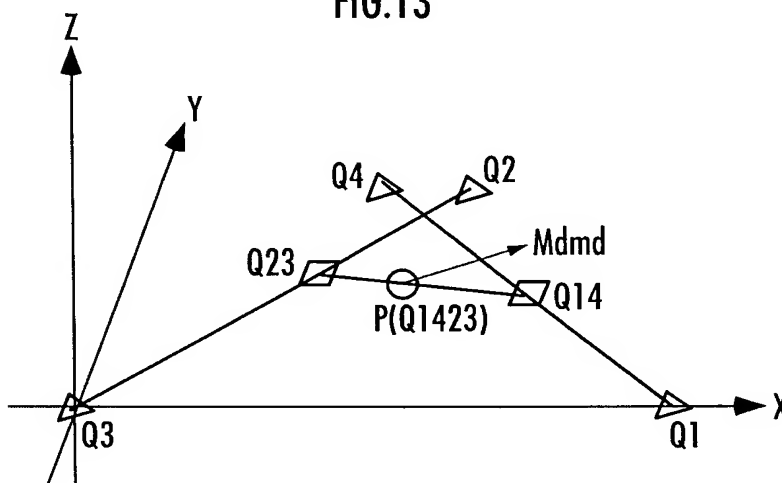
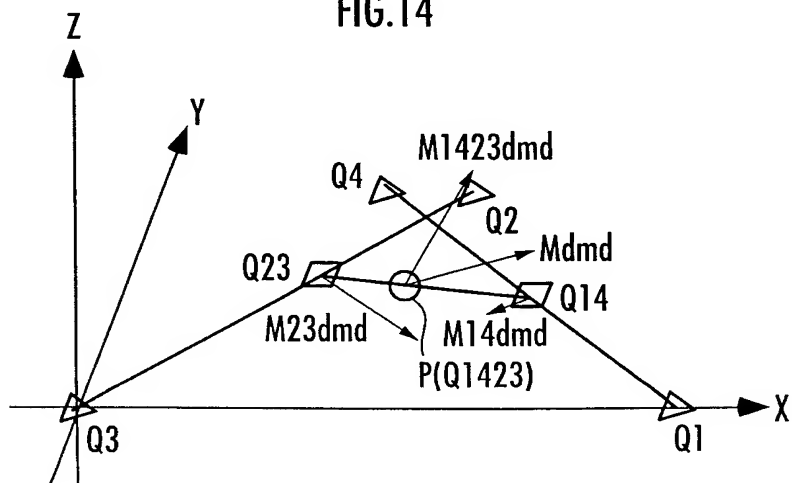


FIG.14



10 / 55

FIG.15

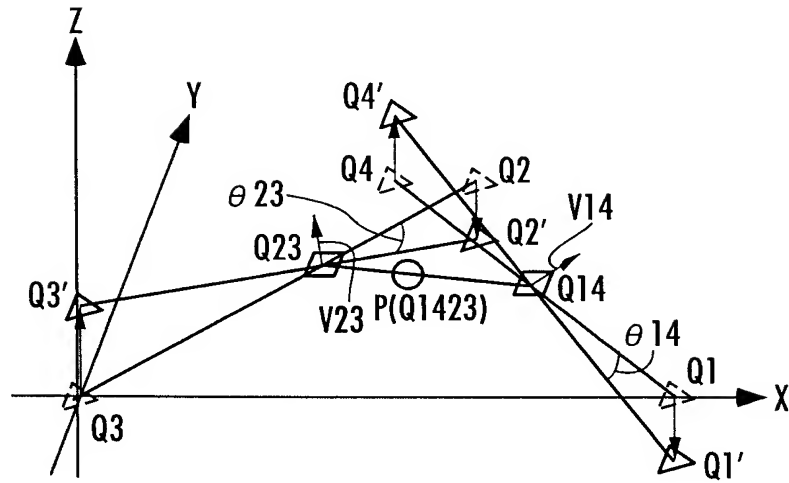
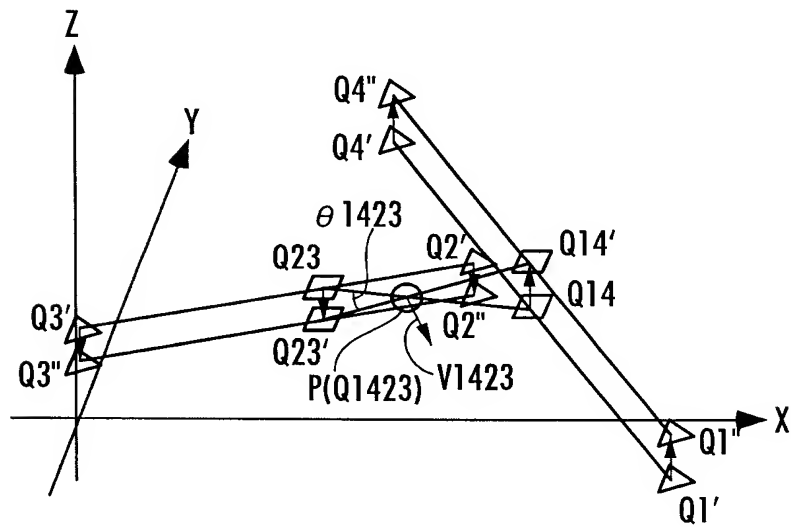
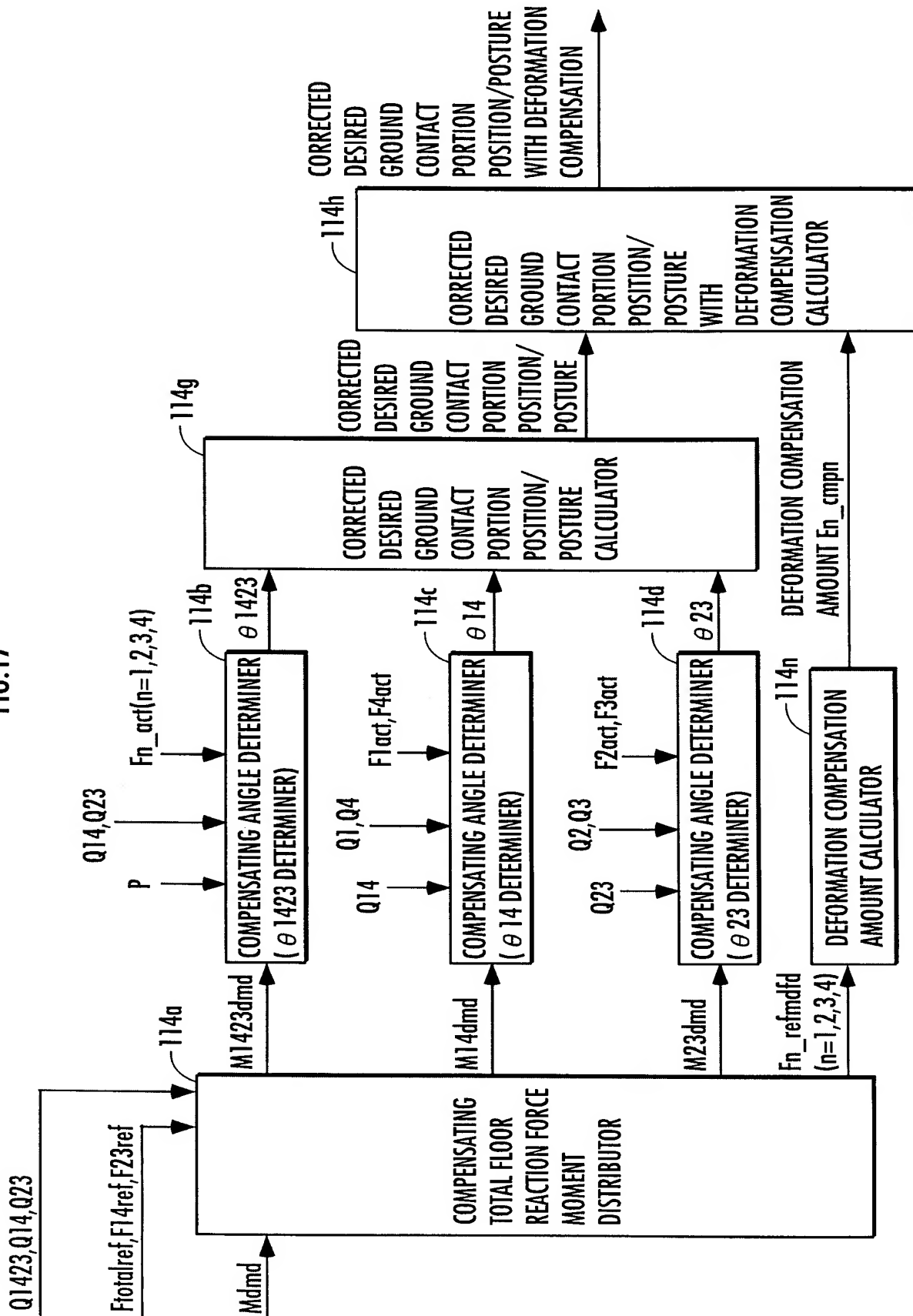


FIG.16



11 / 55

FIG. 17



12 / 55

FIG.18

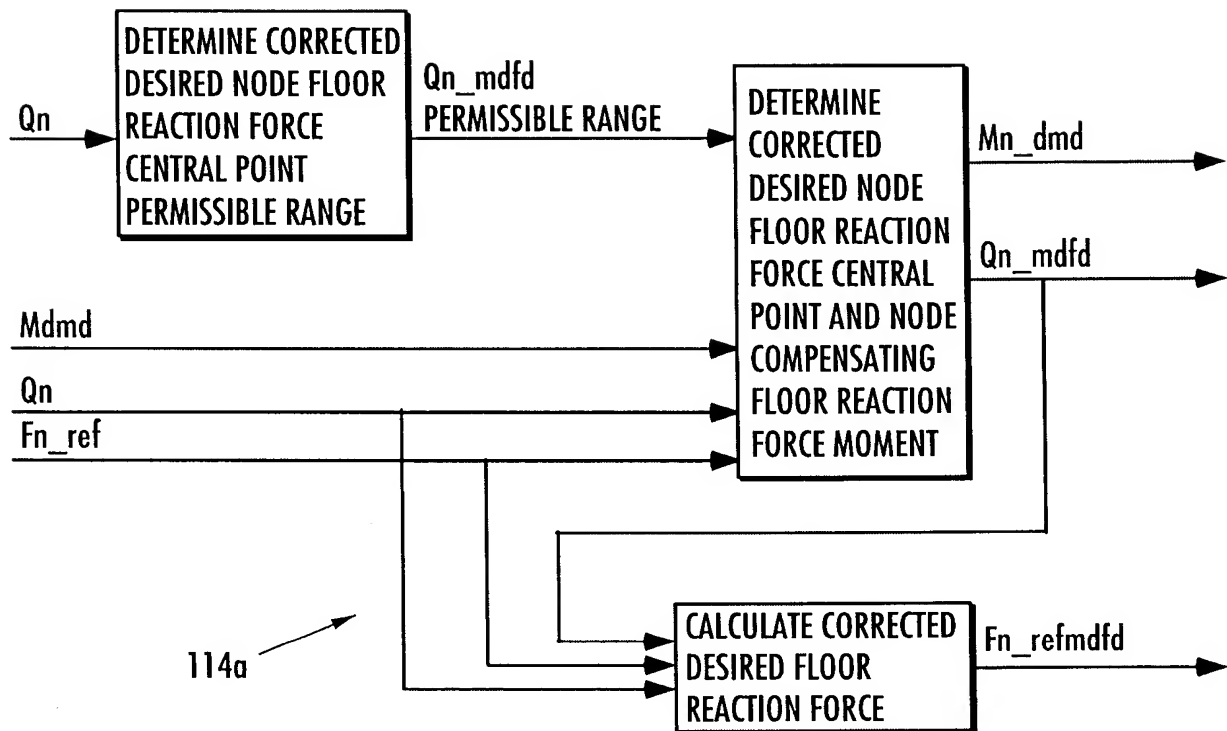
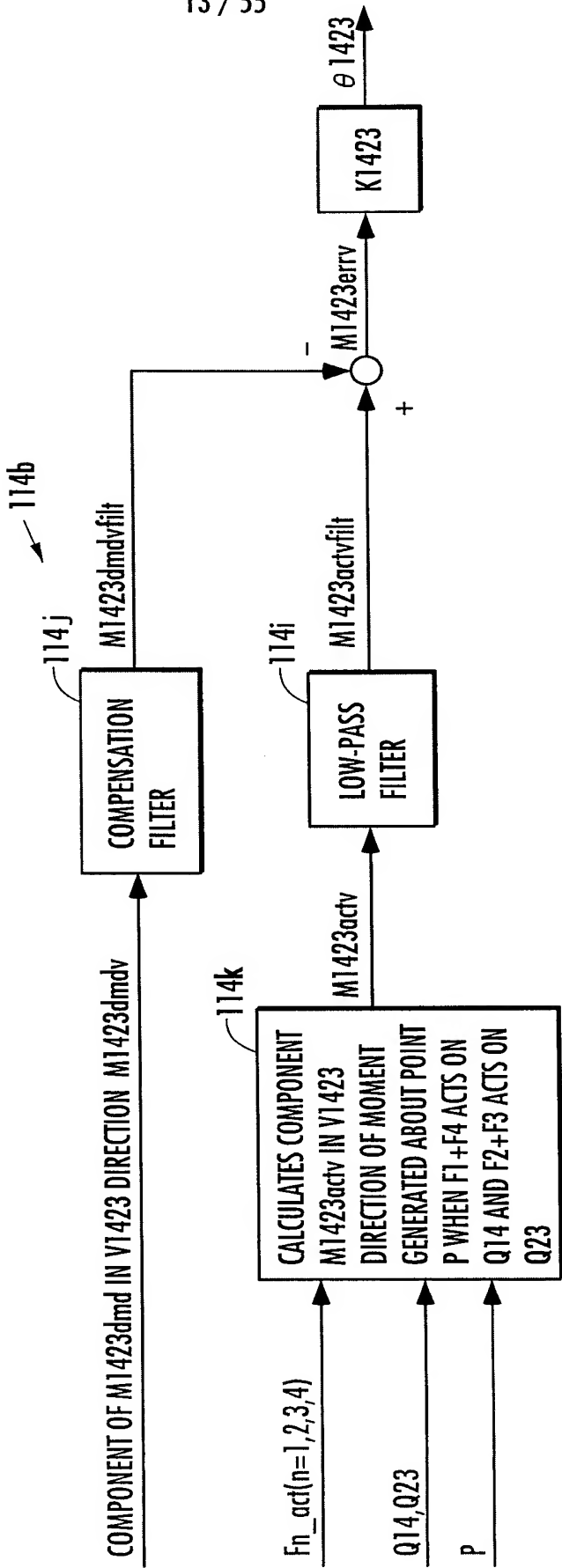
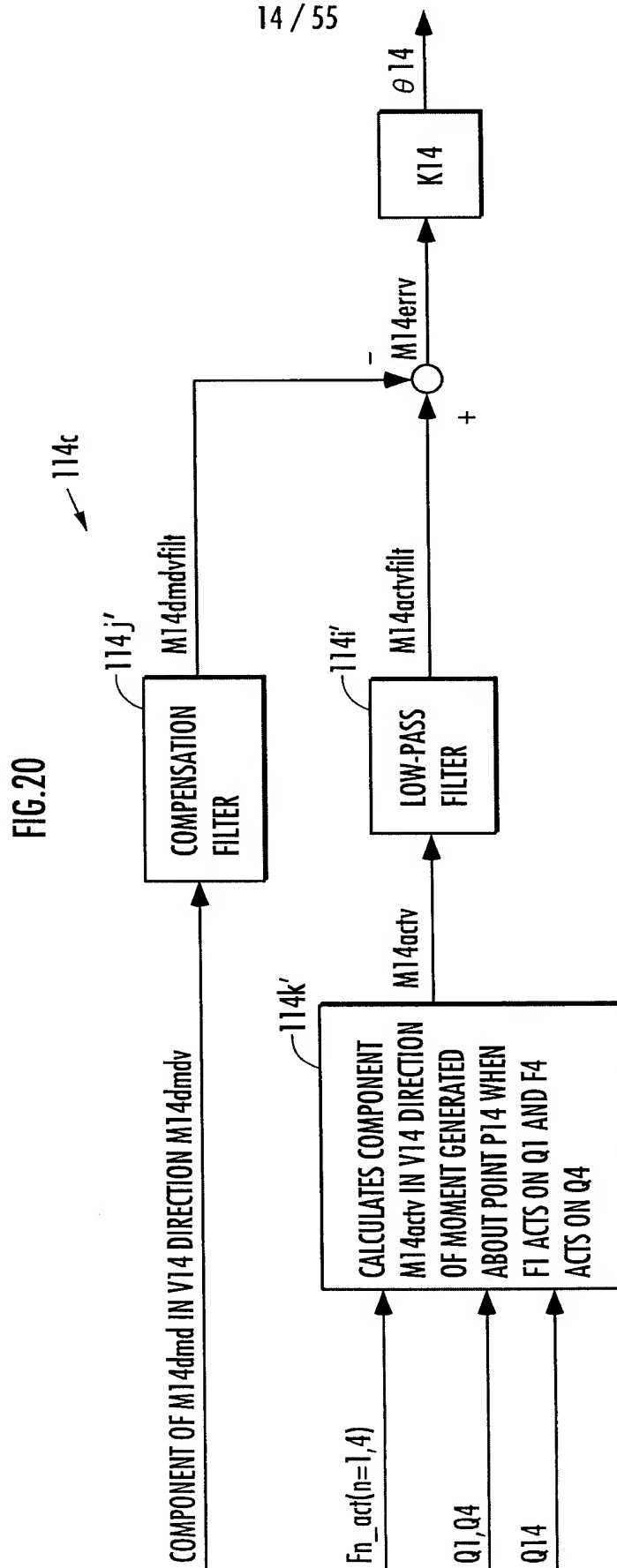


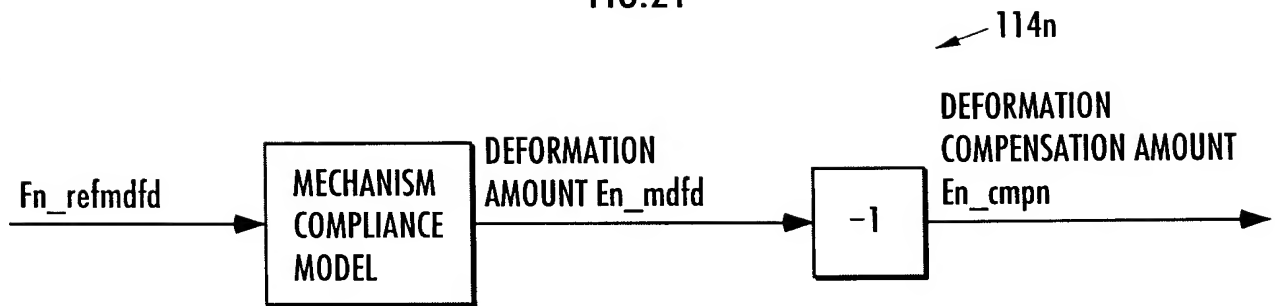
FIG.19





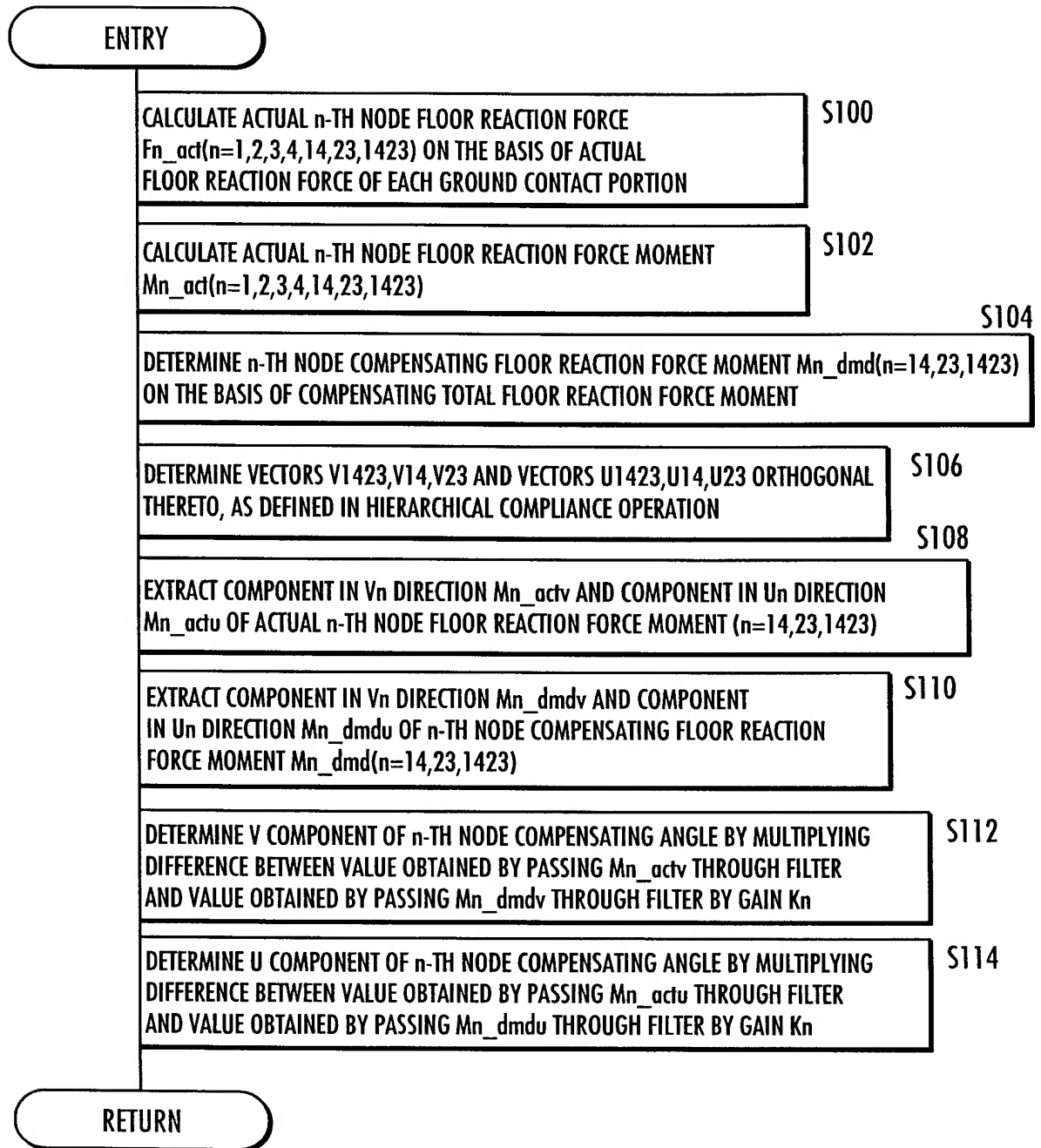
15 / 55

FIG.21



16 / 55

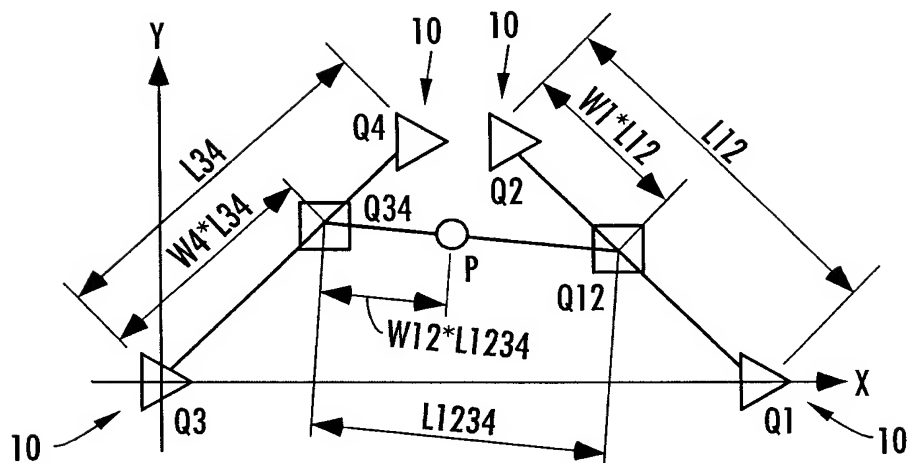
FIG.22





17 / 55

FIG.23



18 / 55

FIG.24

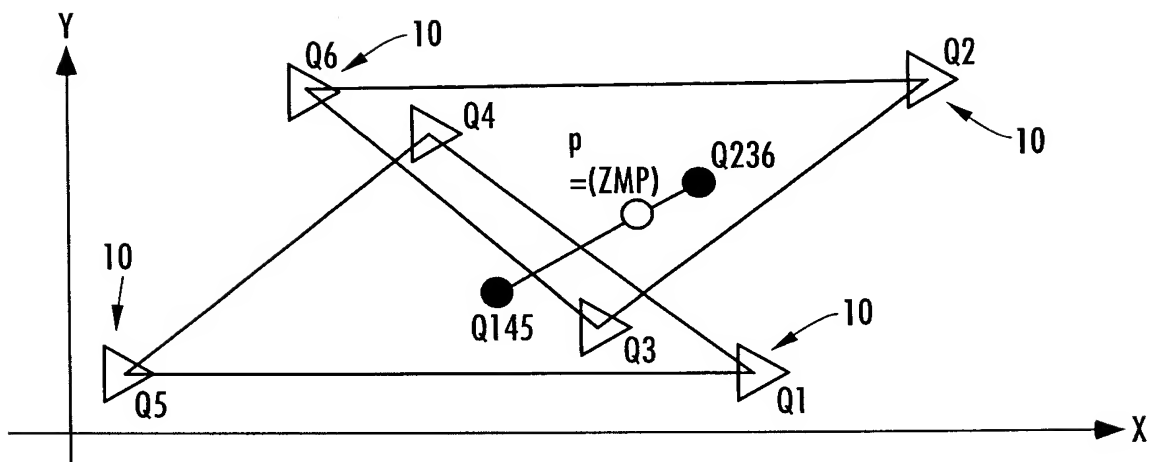
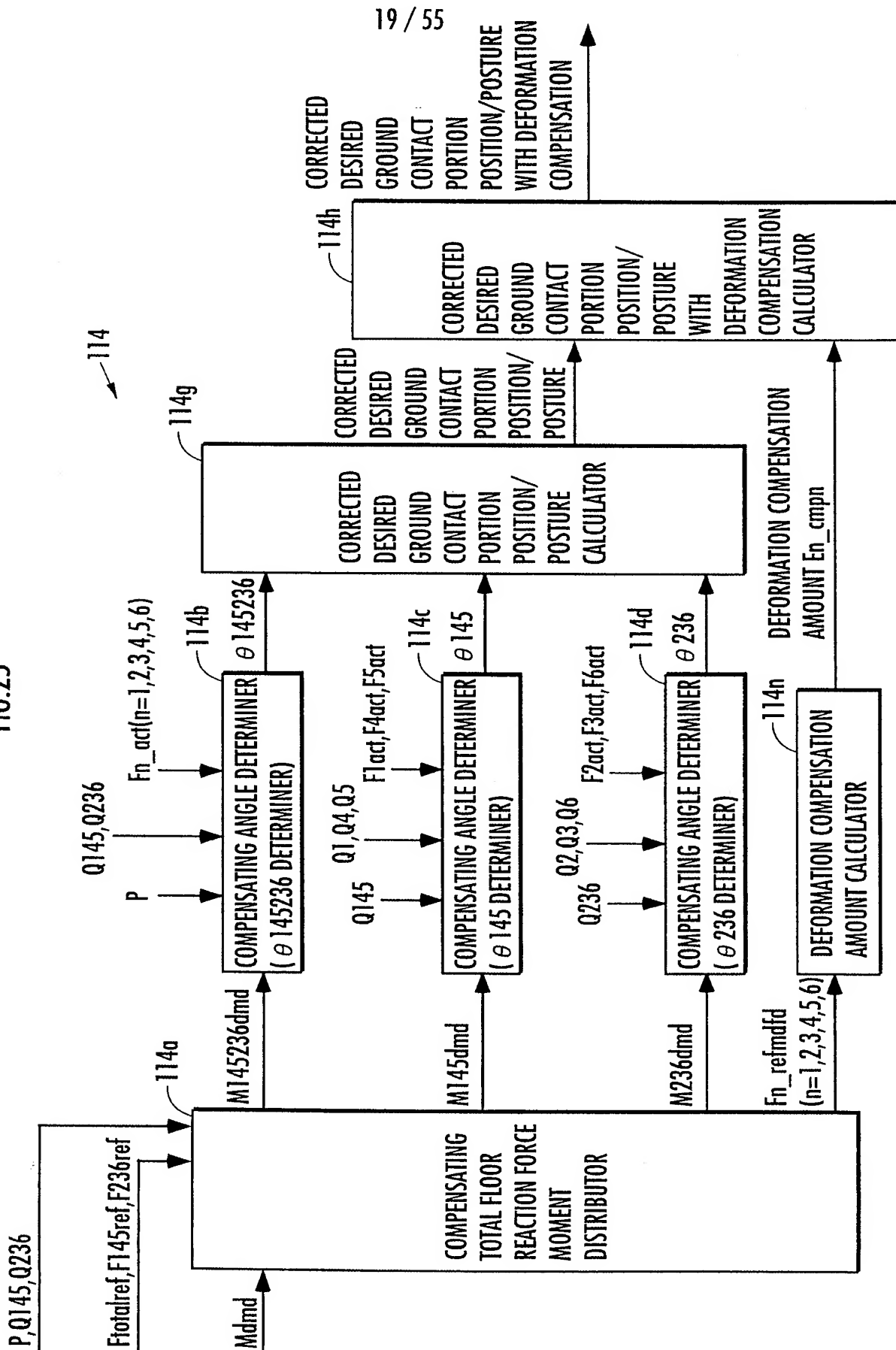


FIG. 25



20 / 55

FIG.26

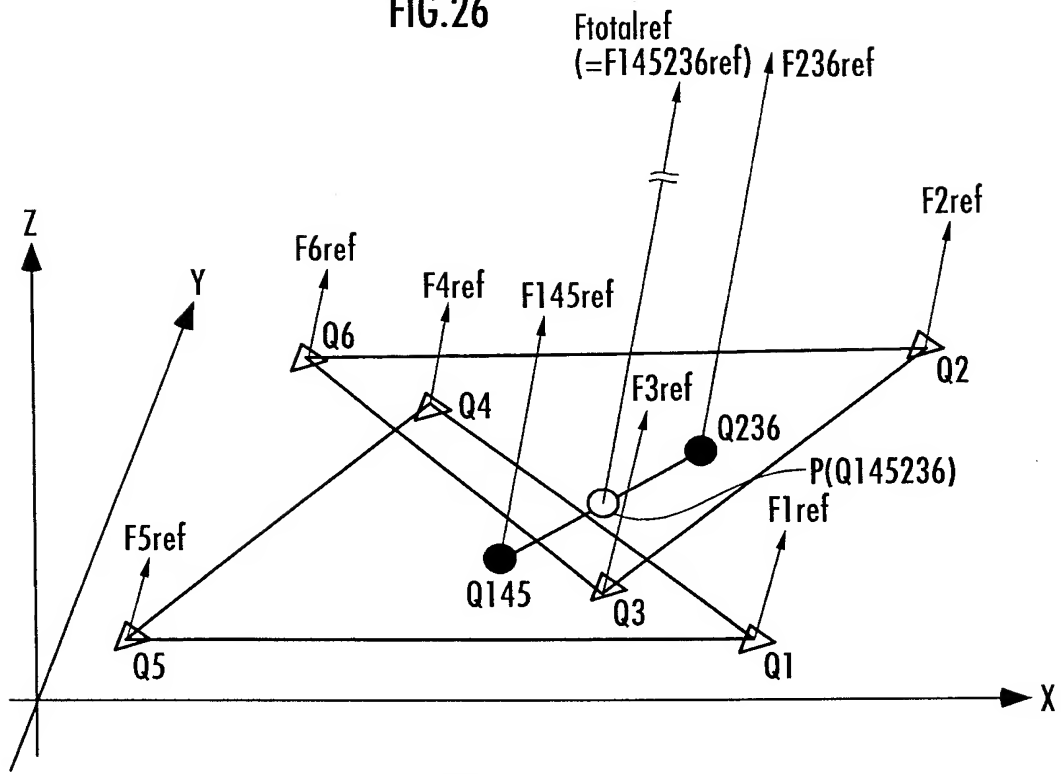
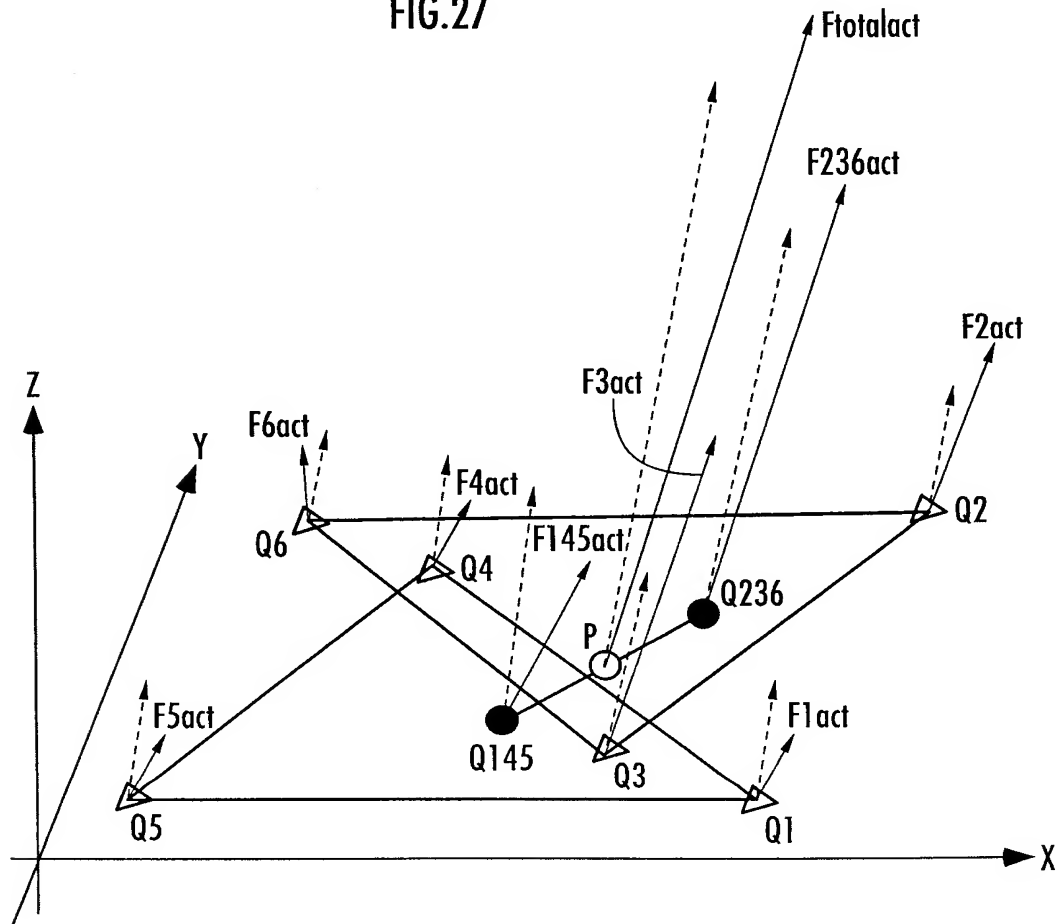
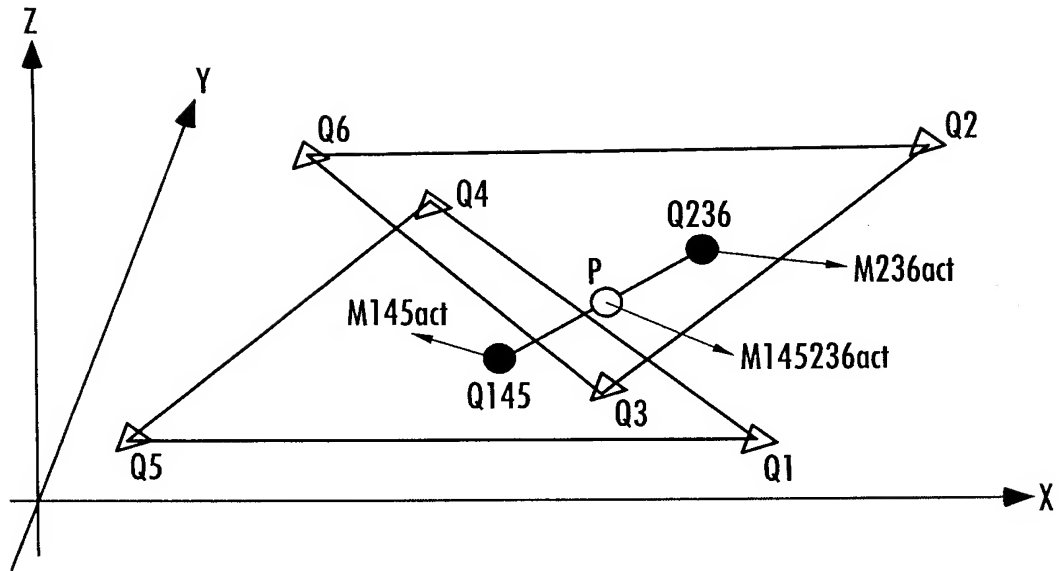


FIG.27



21 / 55

FIG.28



22 / 55

FIG.29(a)

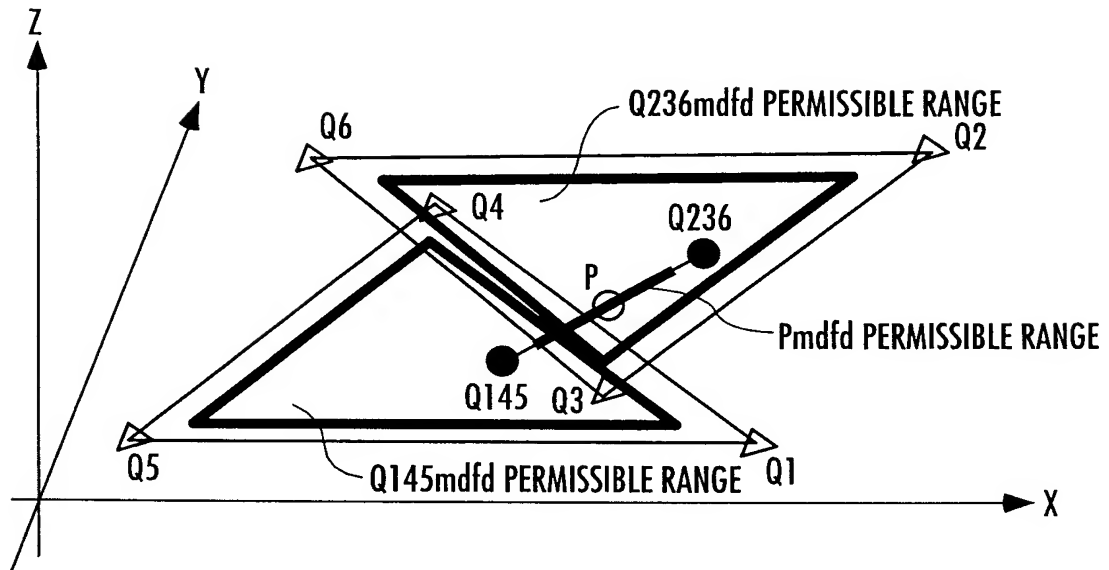
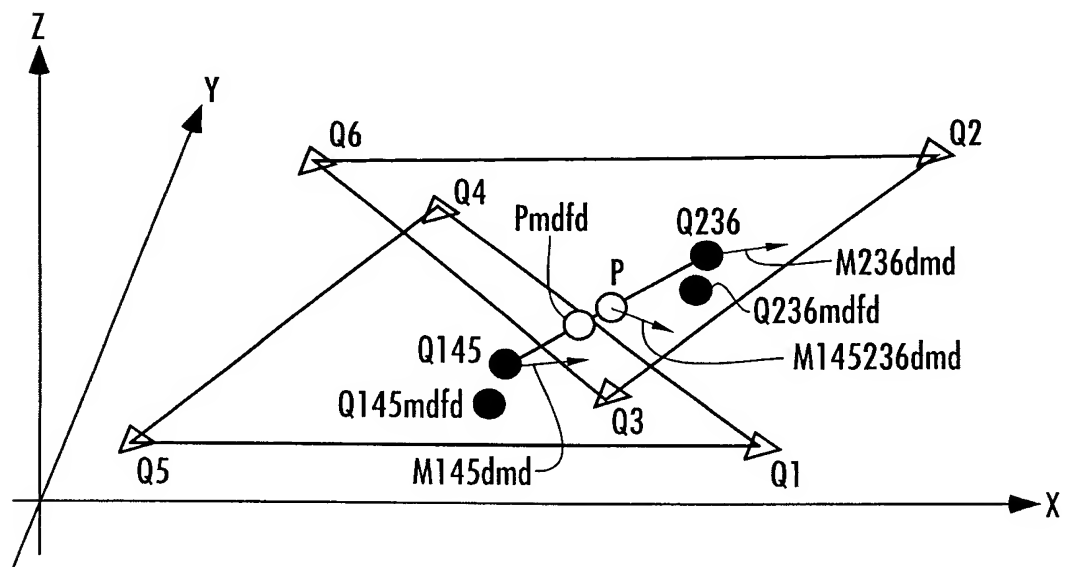


FIG.29(b)



23 / 55

FIG.30

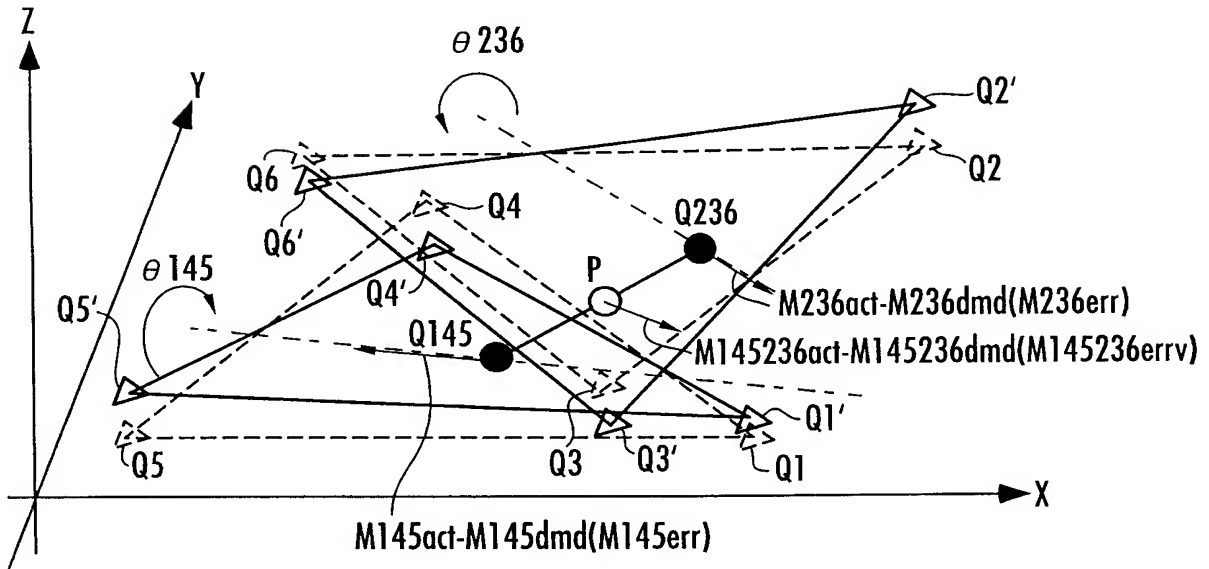


FIG.31

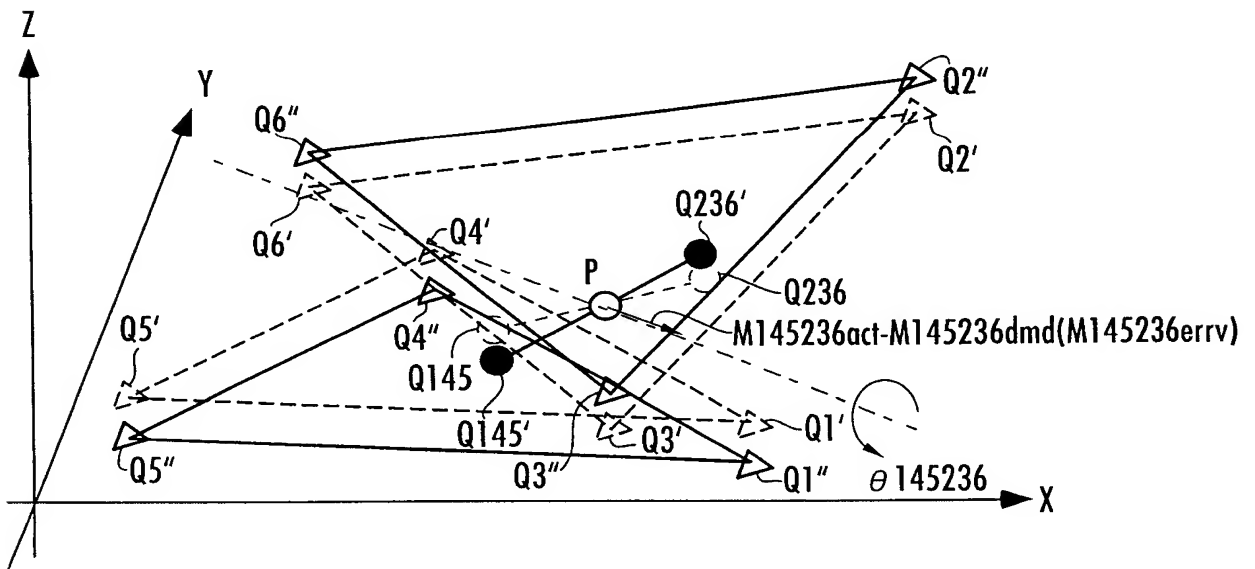


FIG.32

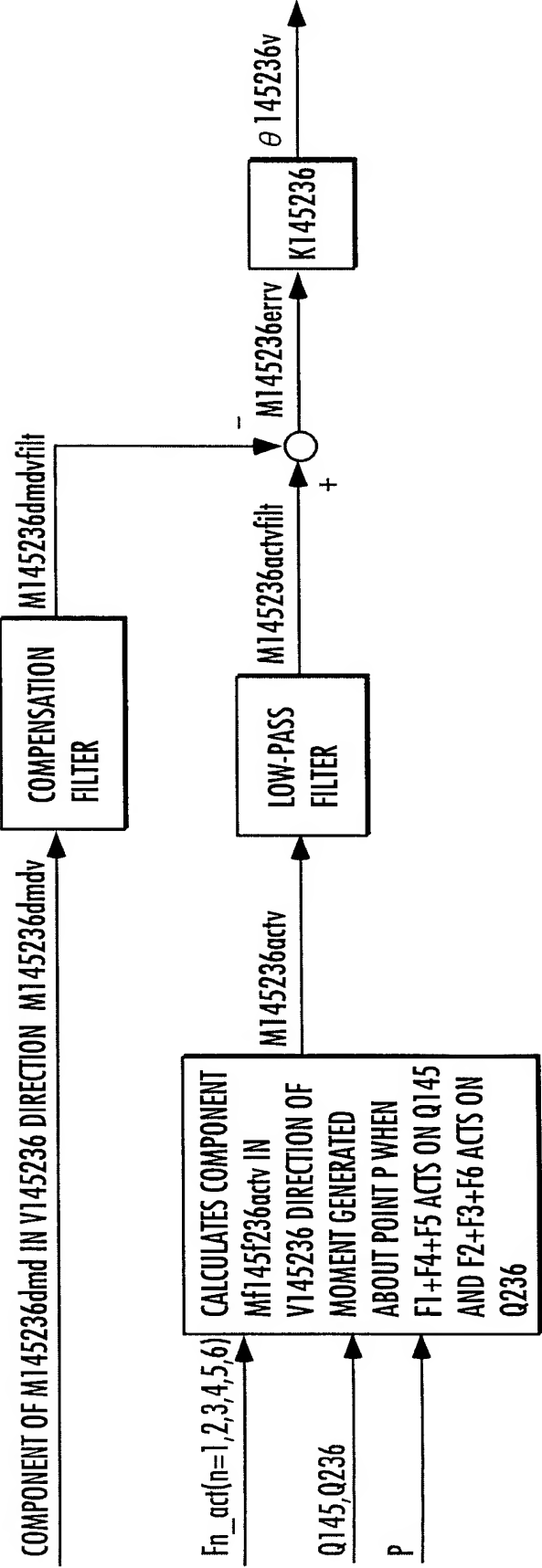
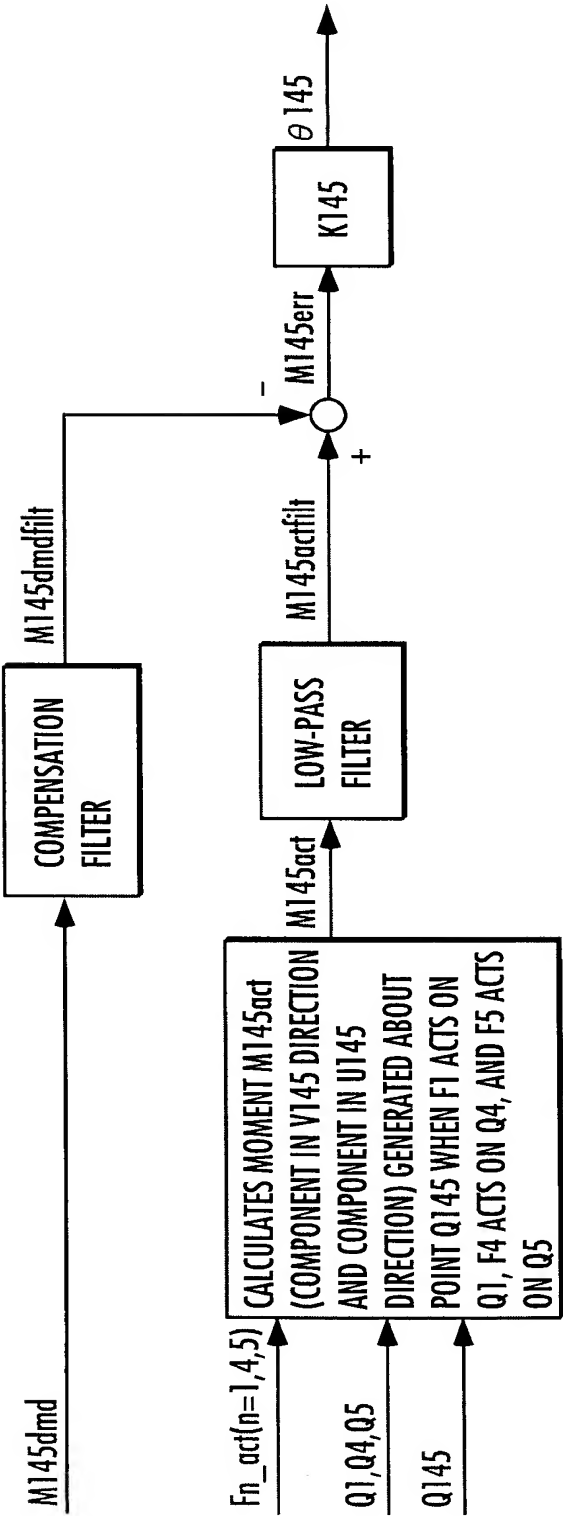


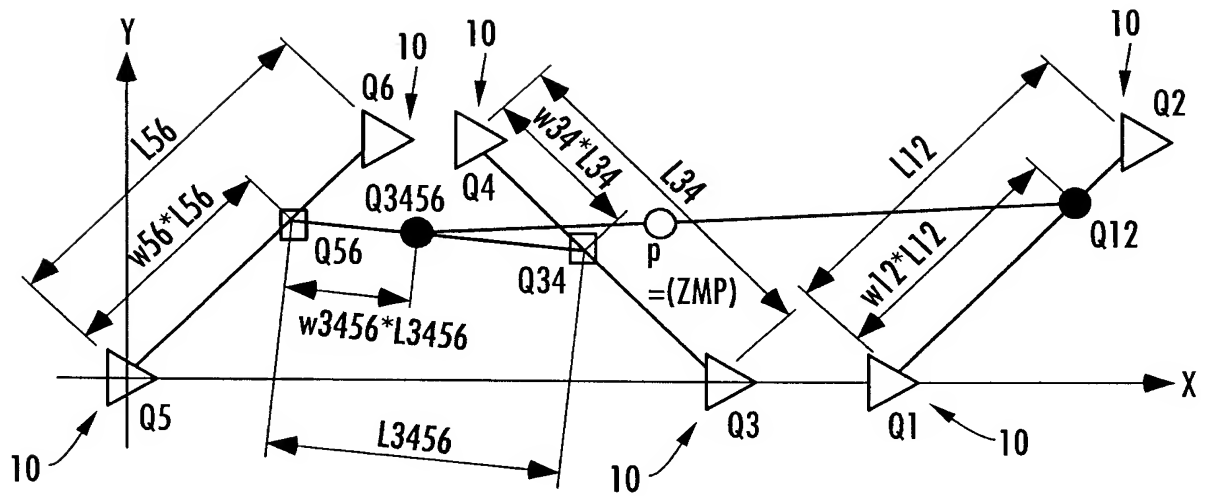


FIG.33

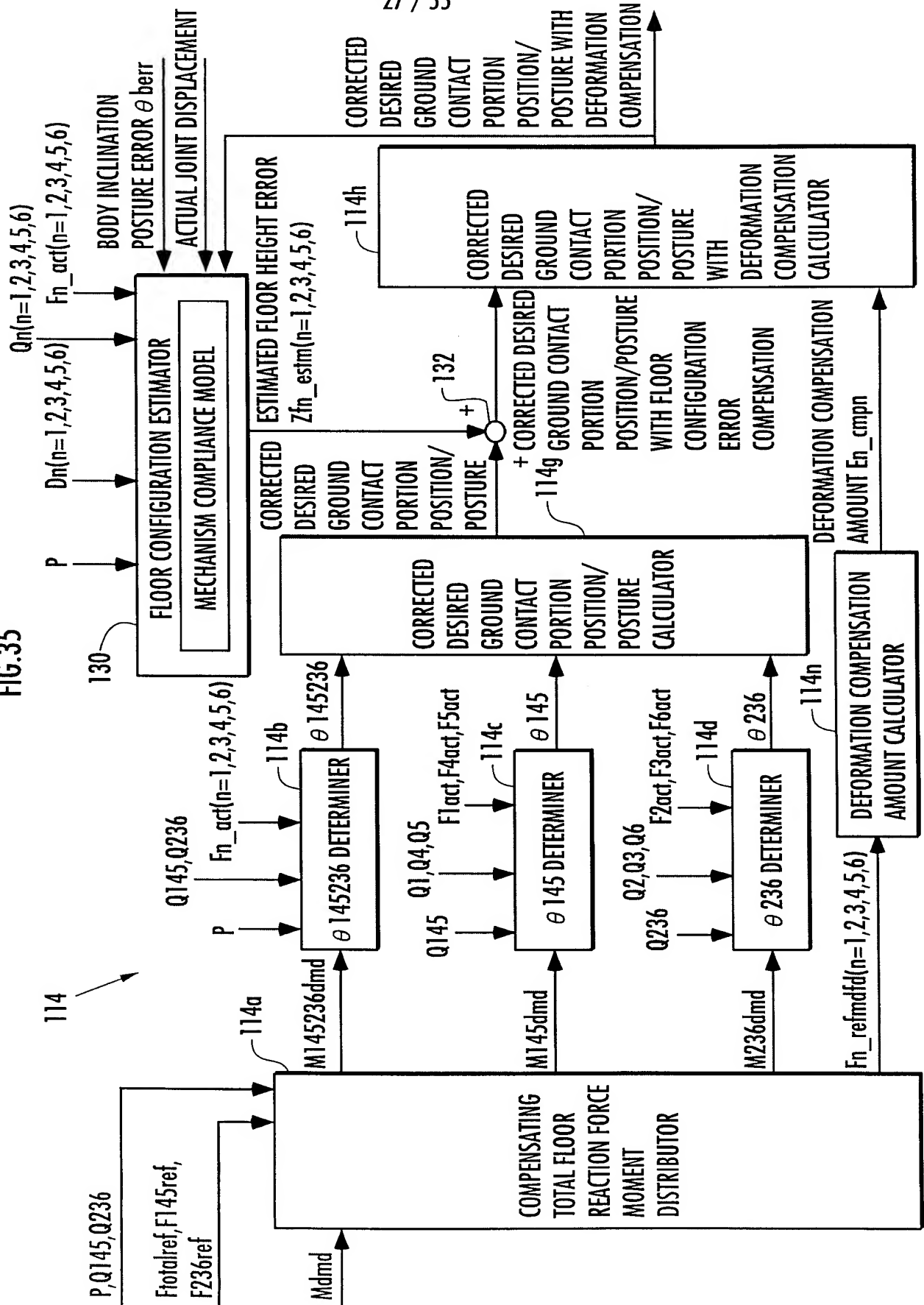


26 / 55

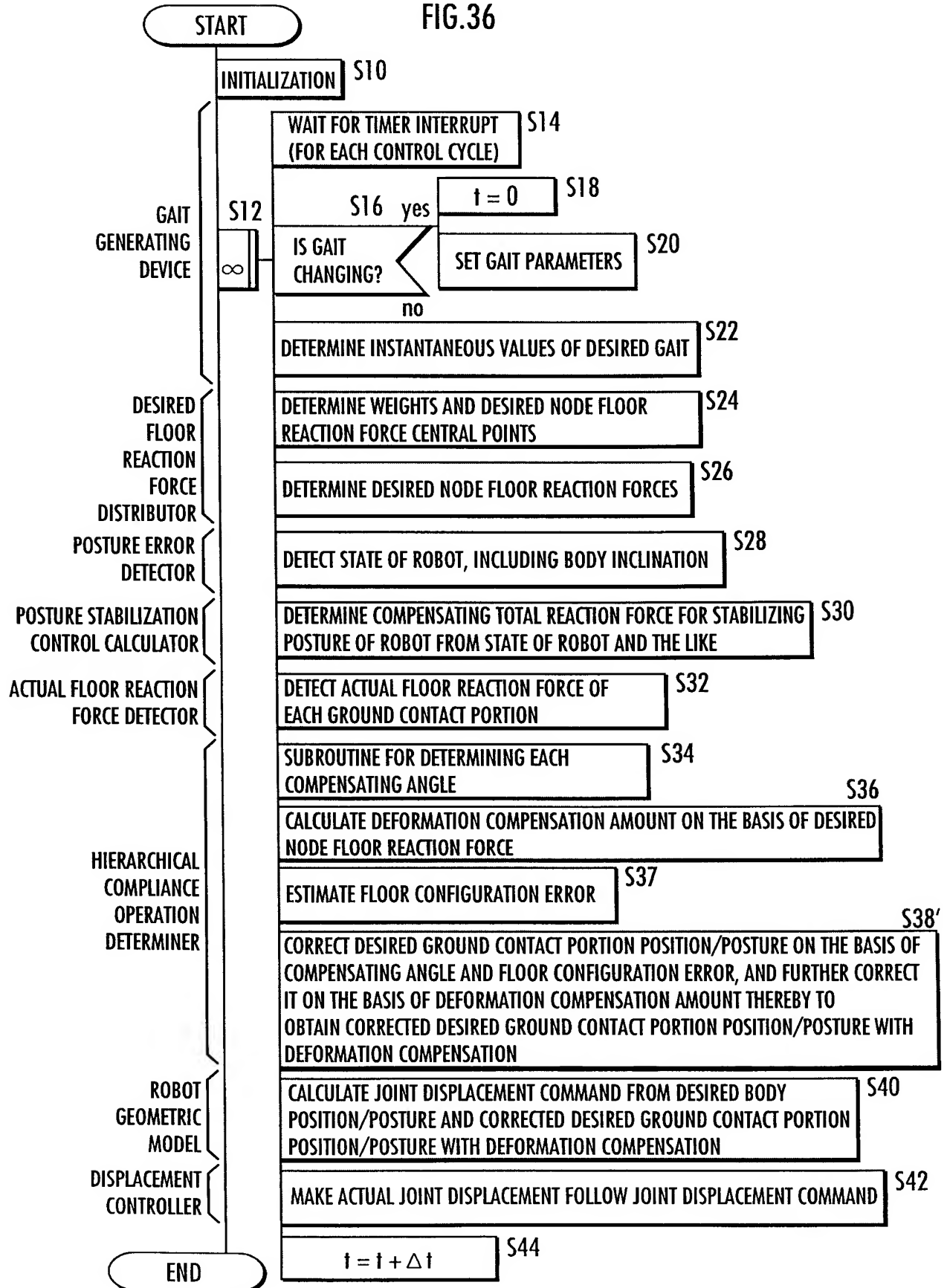
FIG.34



**FIG. 35**

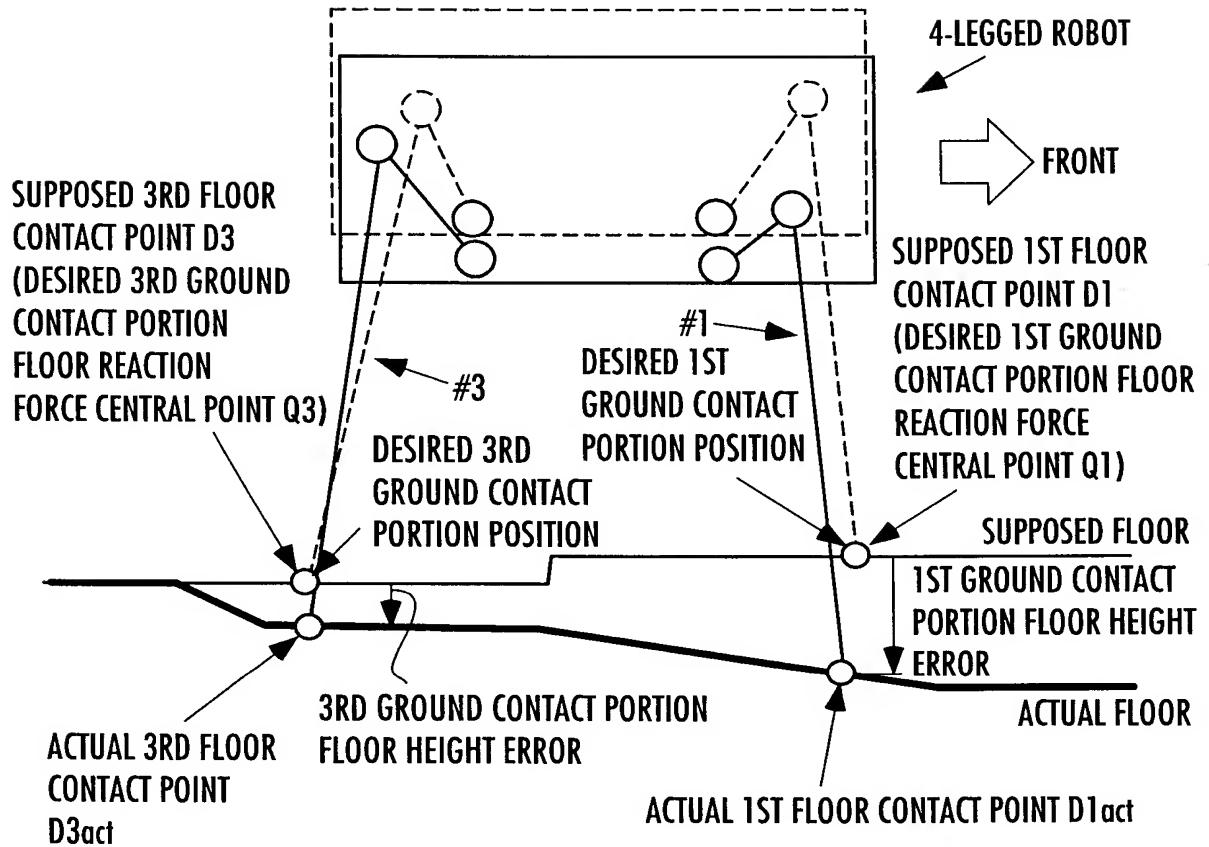


28 / 55  
FIG.36



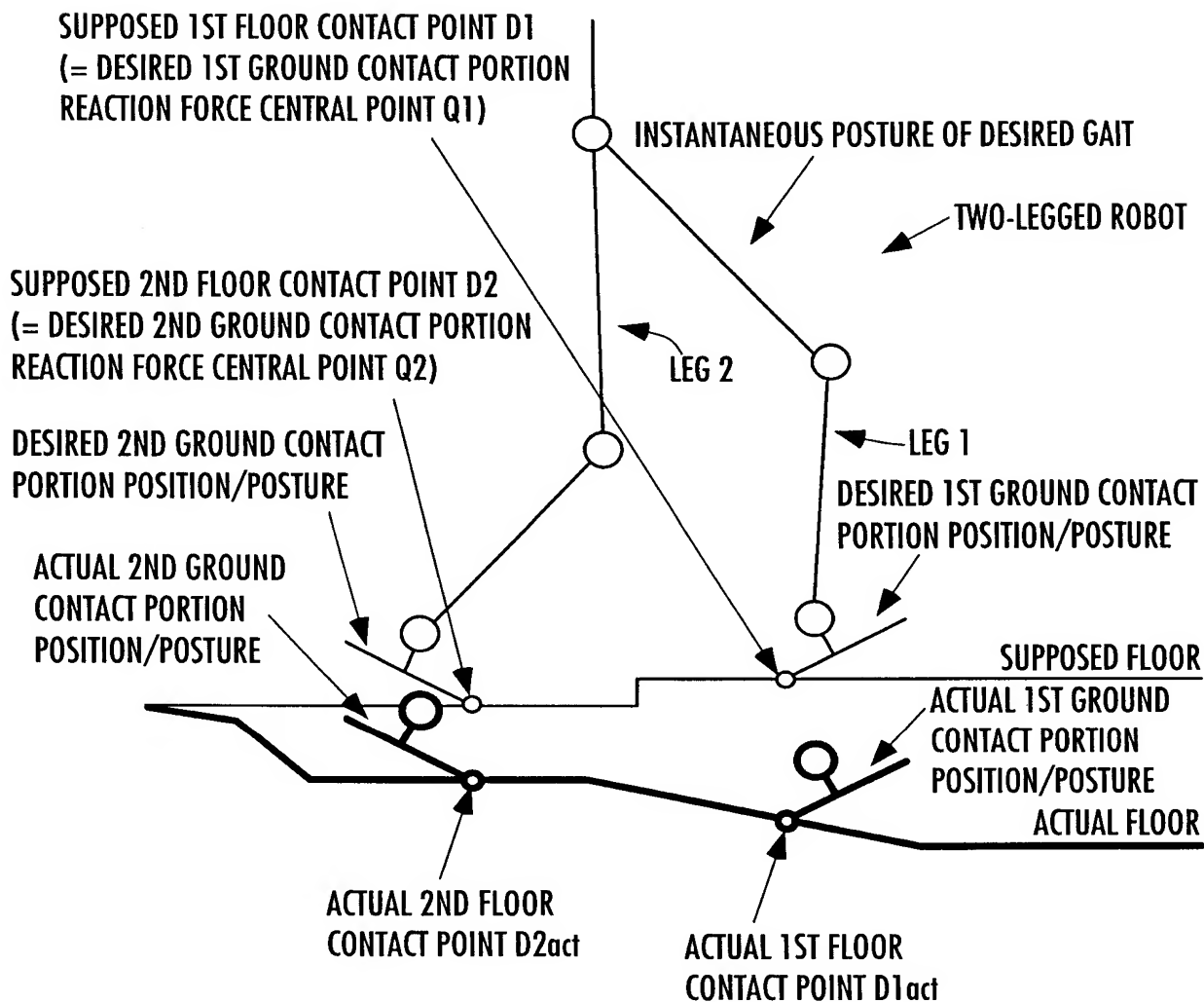
29 / 55

FIG.37



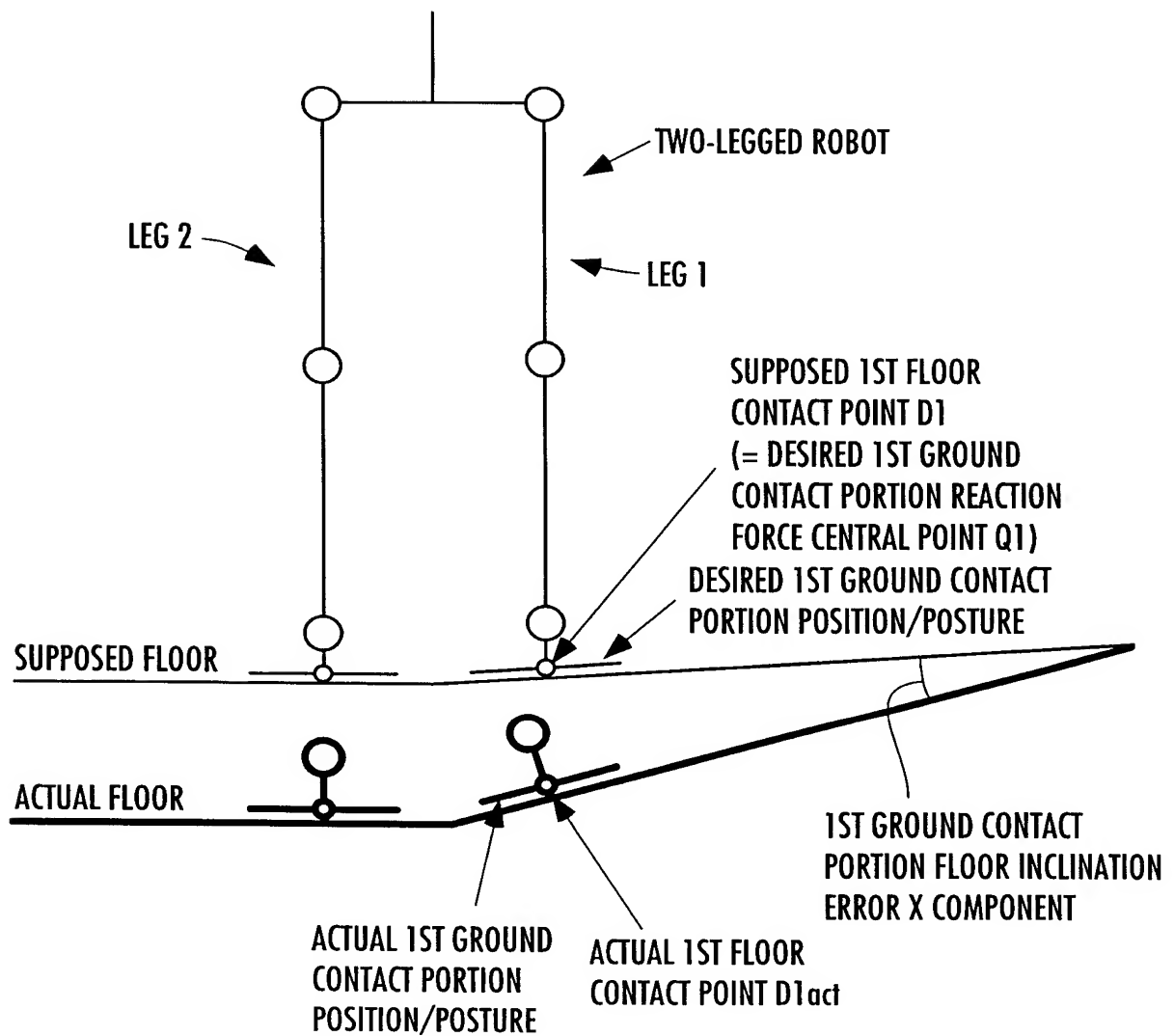
30 / 55

FIG.38



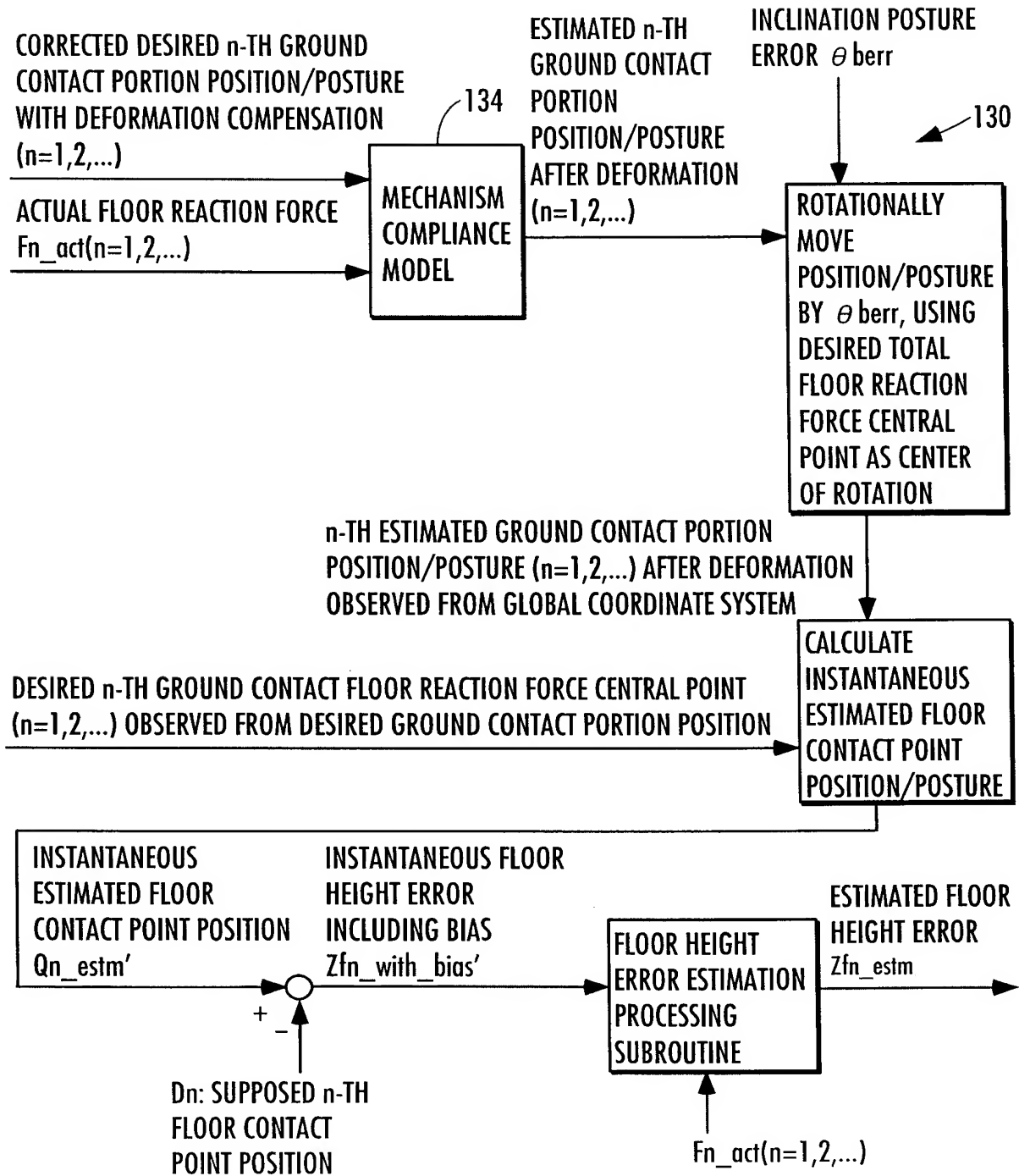
31 / 55

FIG.39



32 / 55

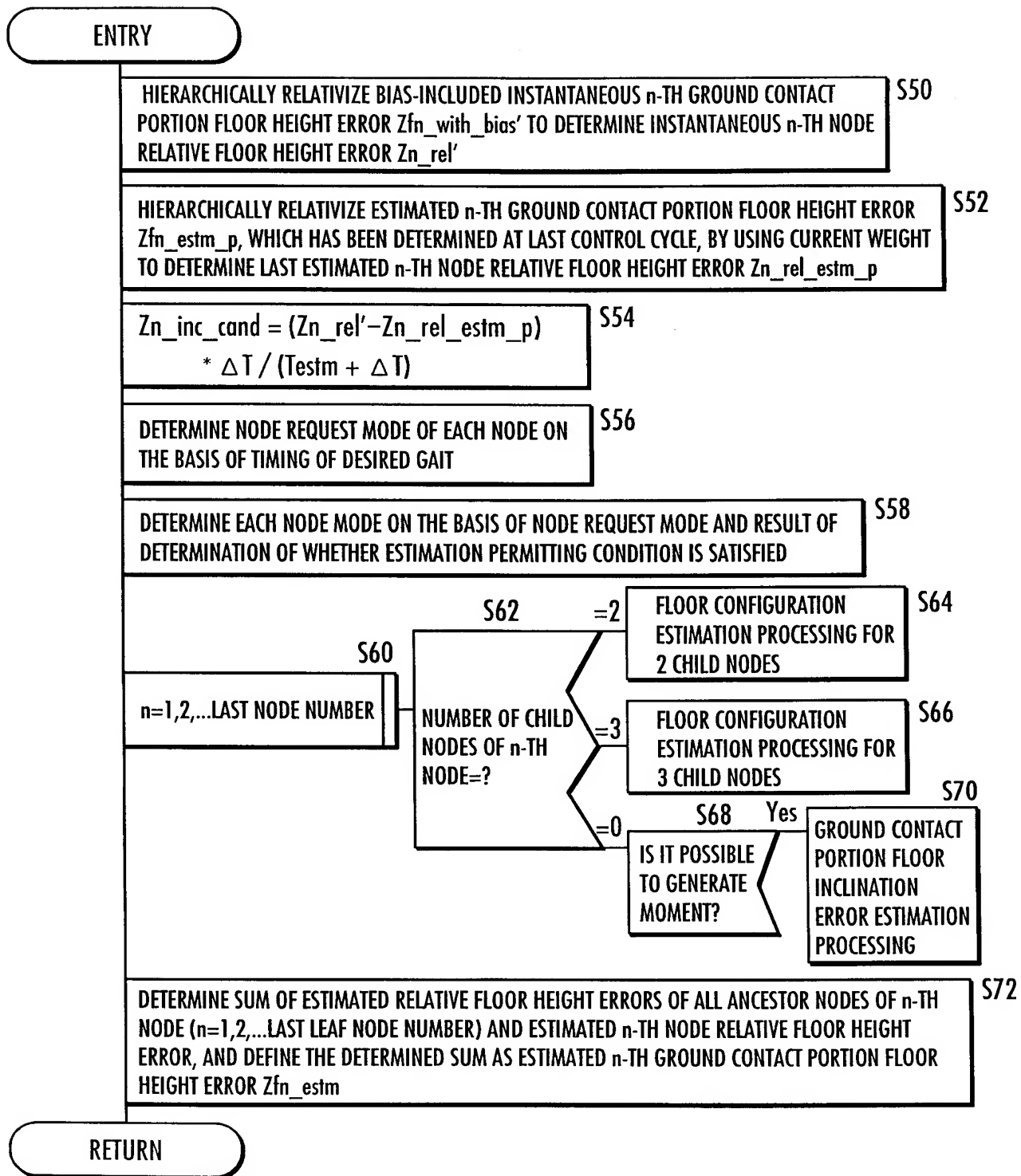
FIG.40





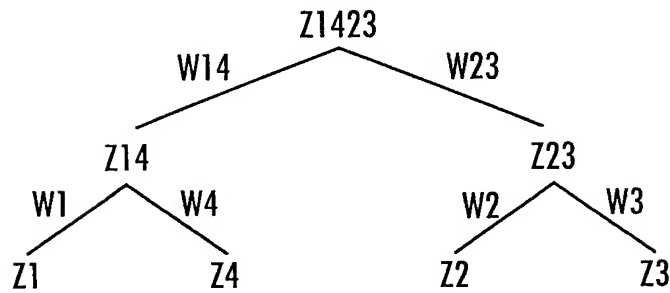
33 / 55

FIG.41



34 / 55

FIG.42



$$Z14\_with\_bias = W1 \cdot Z1\_with\_bias + W4 \cdot Z4\_with\_bias$$

$$Z23\_with\_bias = W2 \cdot Z2\_with\_bias + W3 \cdot Z3\_with\_bias$$

$$Z1423\_with\_bias = W14 \cdot Z14\_with\_bias + W23 \cdot Z23\_with\_bias$$

$$Z1\_rel = Z1\_with\_bias - Z14\_with\_bias$$

$$Z4\_rel = Z4\_with\_bias - Z14\_with\_bias$$

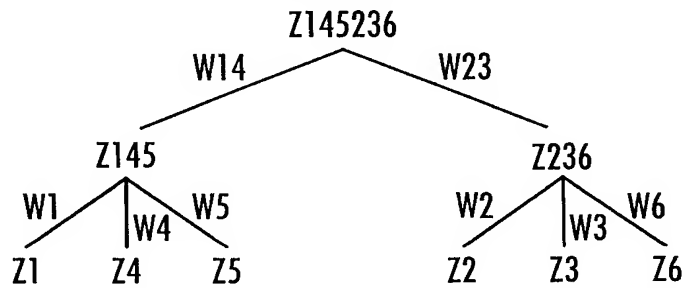
$$Z2\_rel = Z2\_with\_bias - Z23\_with\_bias$$

$$Z3\_rel = Z3\_with\_bias - Z23\_with\_bias$$

$$Z14\_rel = Z14\_with\_bias - Z1423\_with\_bias$$

$$Z23\_rel = Z23\_with\_bias - Z1423\_with\_bias$$

FIG.43



$$Z145\_with\_bias = W1 \cdot Z1\_with\_bias + W4 \cdot Z4\_with\_bias + W5 \cdot Z5\_with\_bias$$

$$Z236\_with\_bias = W2 \cdot Z2\_with\_bias + W3 \cdot Z3\_with\_bias + W6 \cdot Z6\_with\_bias$$

$$Z145236\_with\_bias = W145 \cdot Z145\_with\_bias + W236 \cdot Z236\_with\_bias$$

$$Z1\_rel = Z1\_with\_bias - Z145\_with\_bias$$

$$Z4\_rel = Z4\_with\_bias - Z145\_with\_bias$$

$$Z5\_rel = Z5\_with\_bias - Z145\_with\_bias$$

$$Z2\_rel = Z2\_with\_bias - Z236\_with\_bias$$

$$Z3\_rel = Z3\_with\_bias - Z236\_with\_bias$$

$$Z6\_rel = Z6\_with\_bias - Z236\_with\_bias$$

$$Z145\_rel = Z145\_with\_bias - Z145236\_with\_bias$$

$$Z236\_rel = Z236\_with\_bias - Z145236\_with\_bias$$

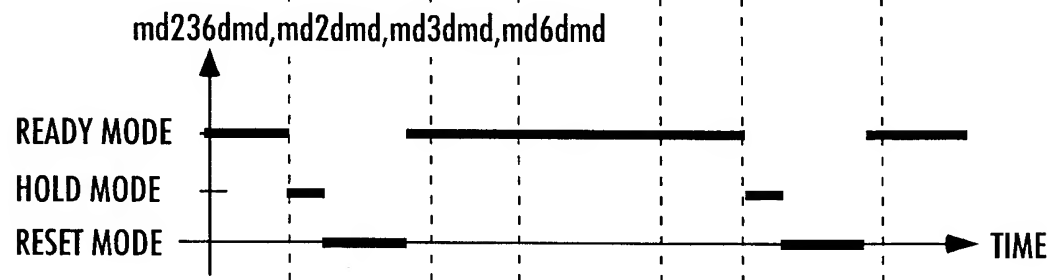
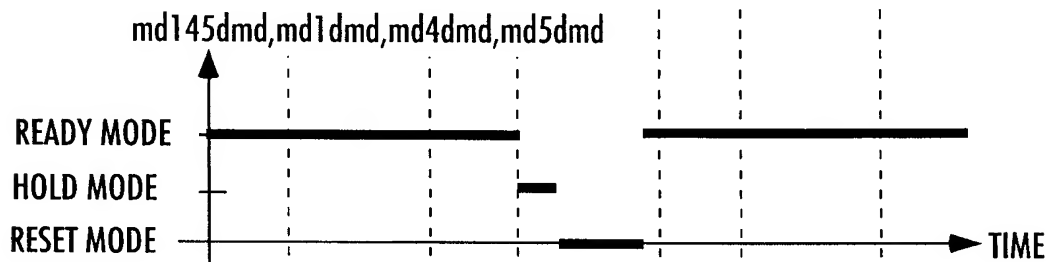
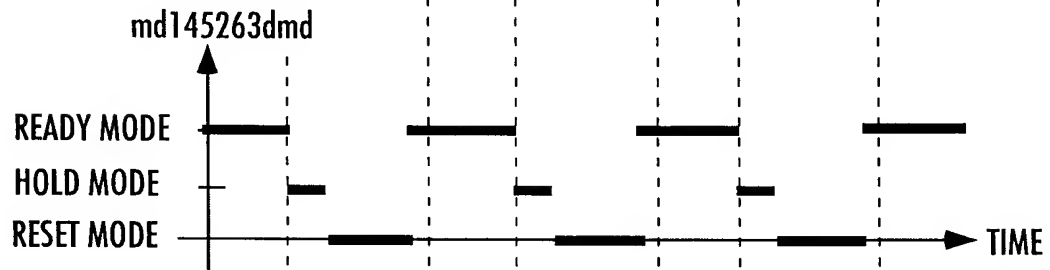
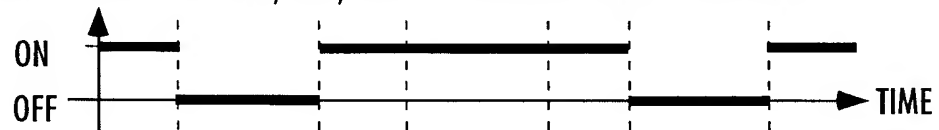
35 / 55

FIG.44

GROUND CONTACT STATES OF 1ST, 4TH, AND 5TH GROUND CONTACT PORTIONS

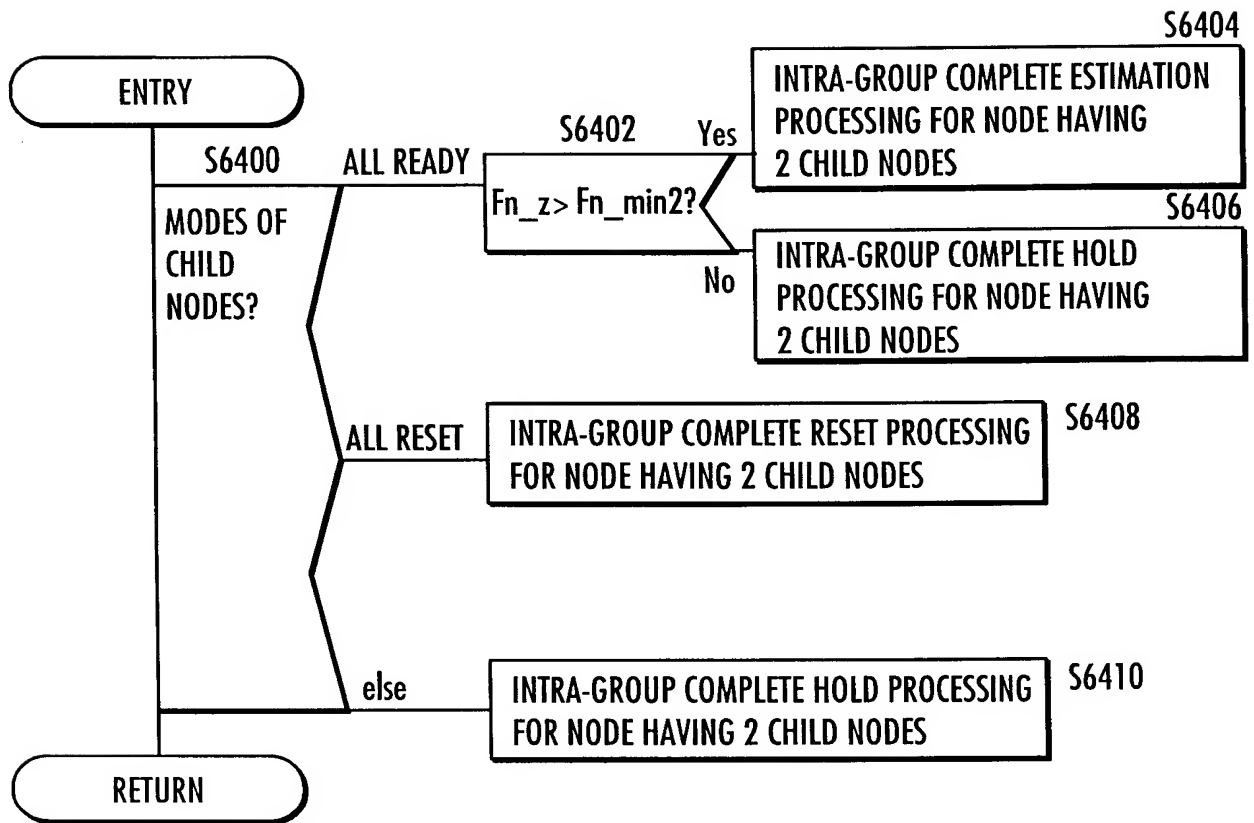


GROUND CONTACT STATES OF 2ND, 3RD, AND 6TH GROUND CONTACT PORTIONS



36 / 55

FIG.45



37 / 55

FIG.46

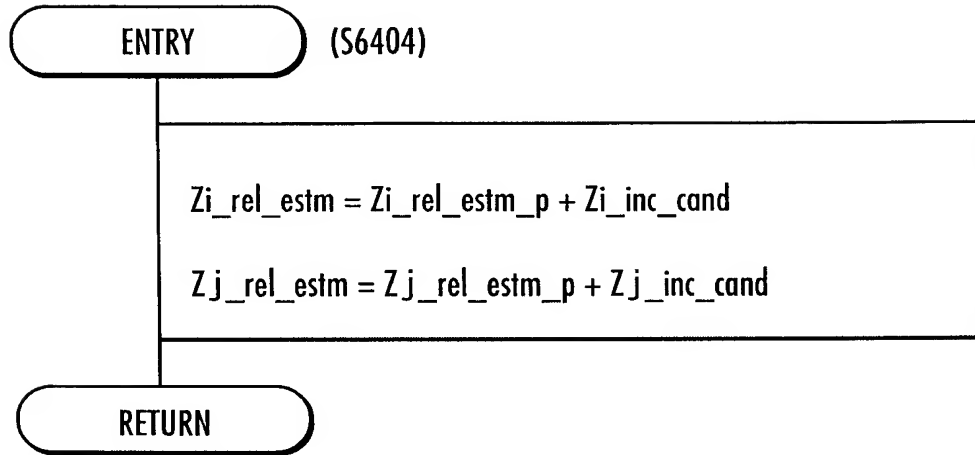


FIG.47

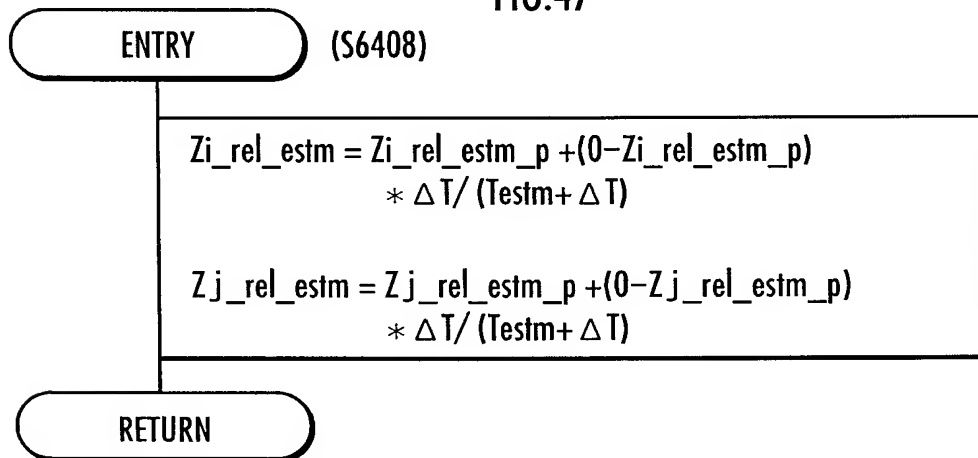
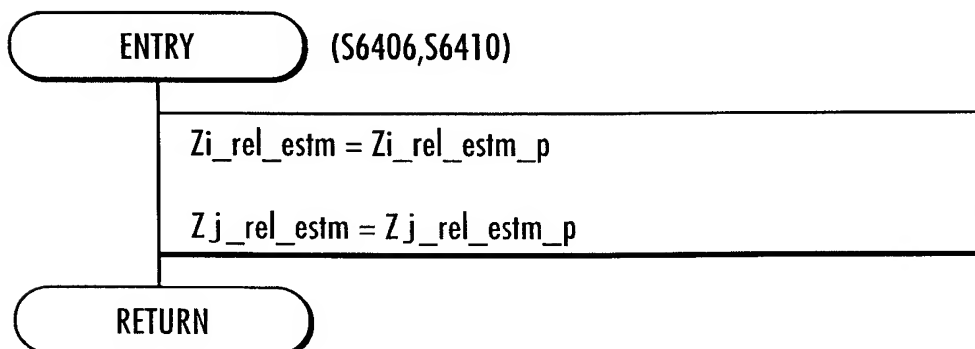
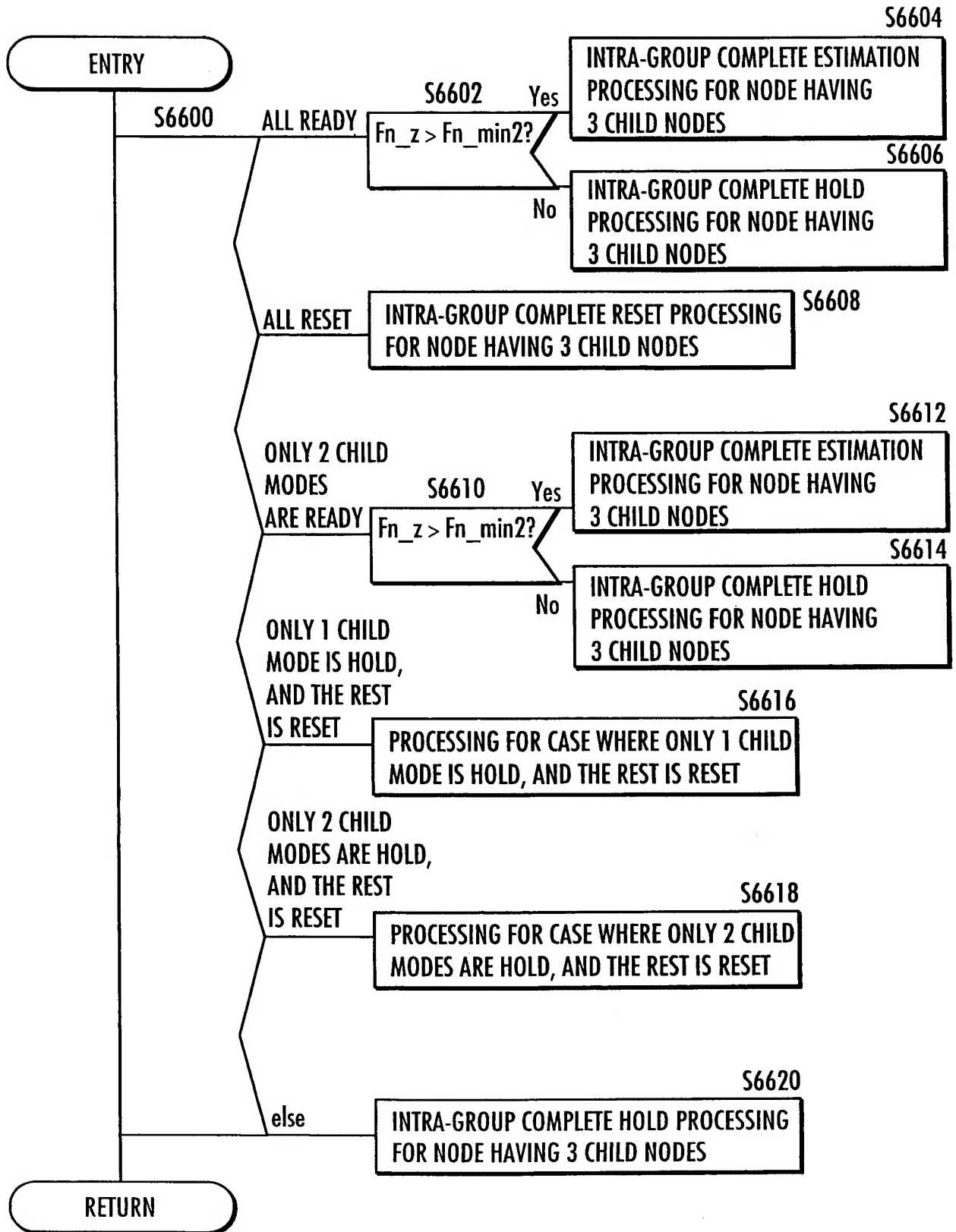


FIG.48



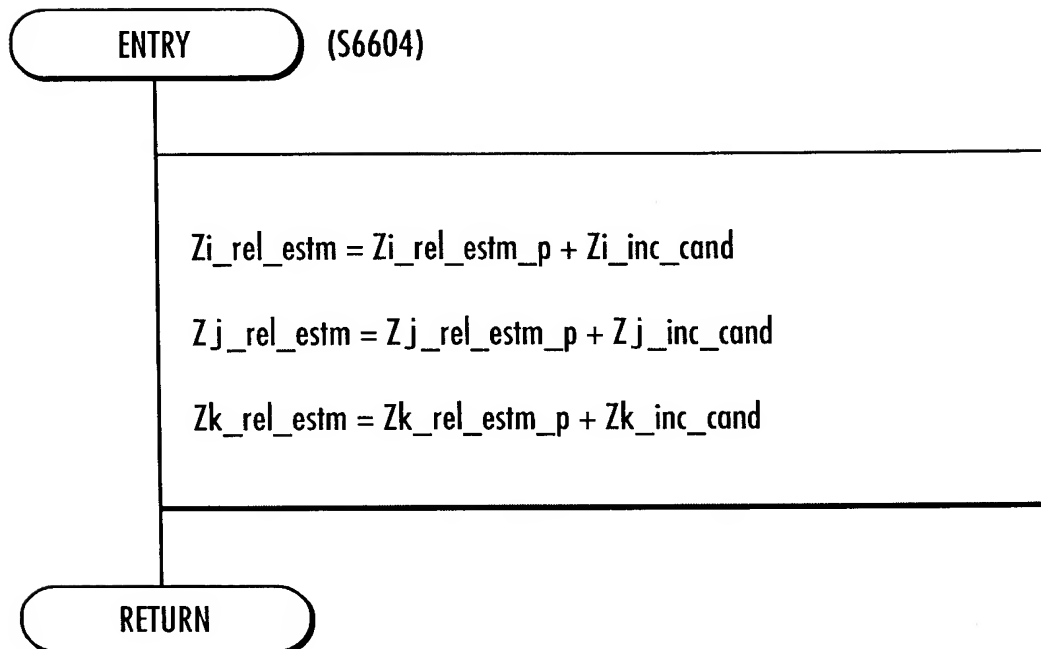
38 / 55

FIG.49



39 / 55

FIG.50



40 / 55

FIG.51

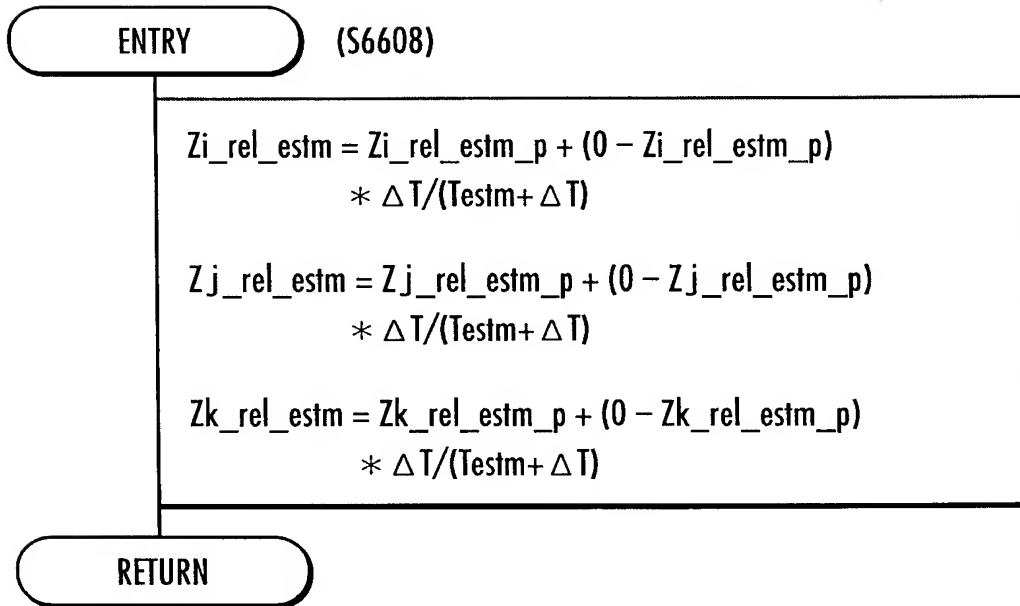
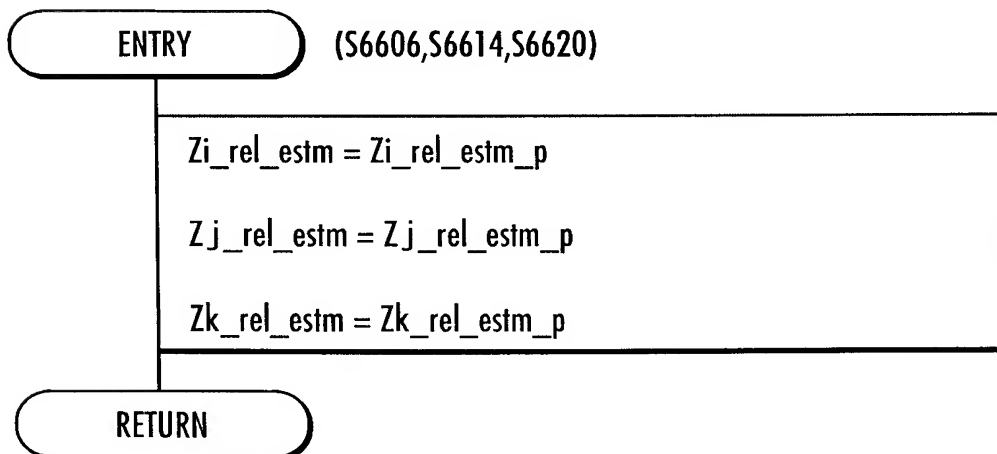


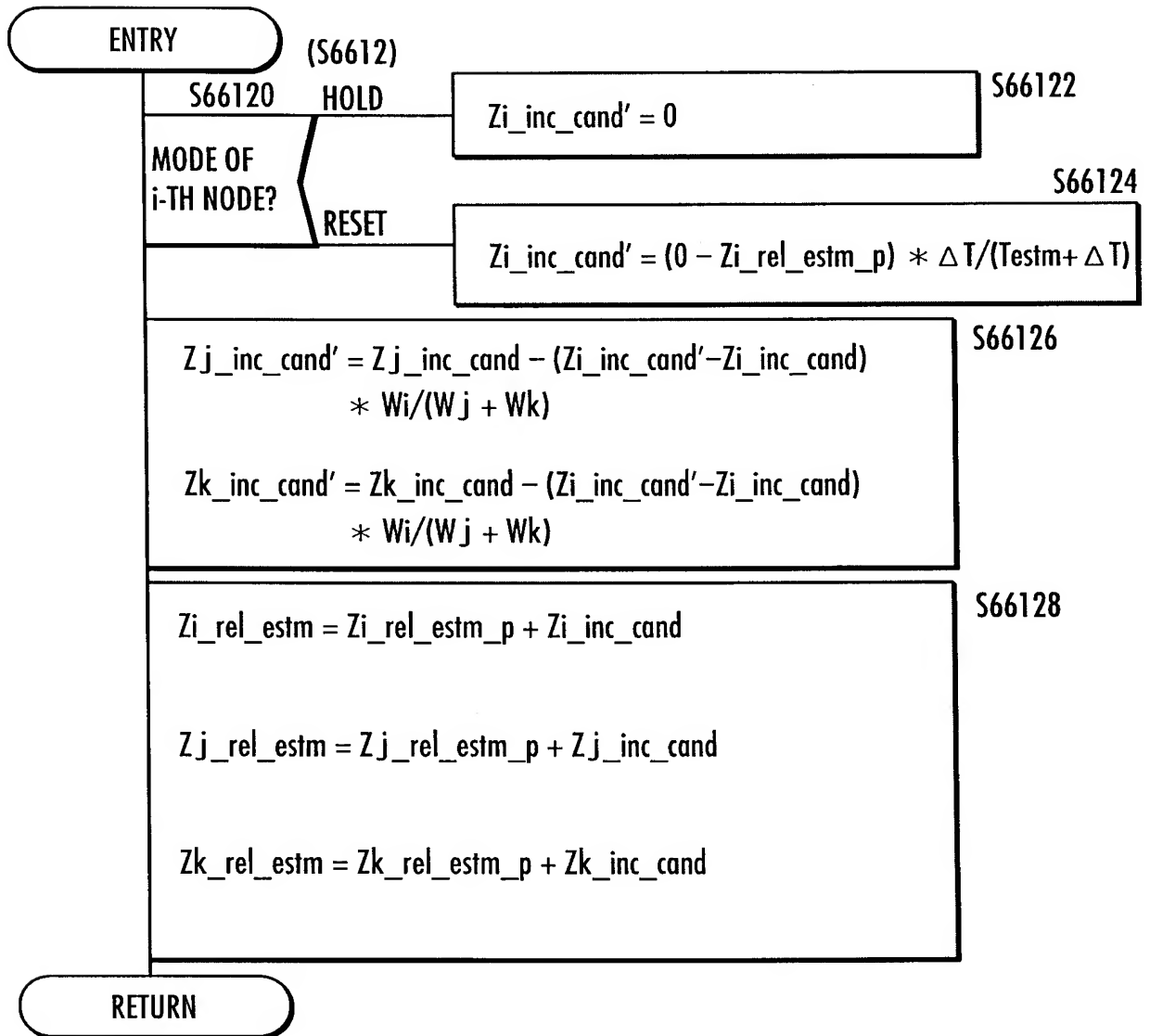
FIG.52





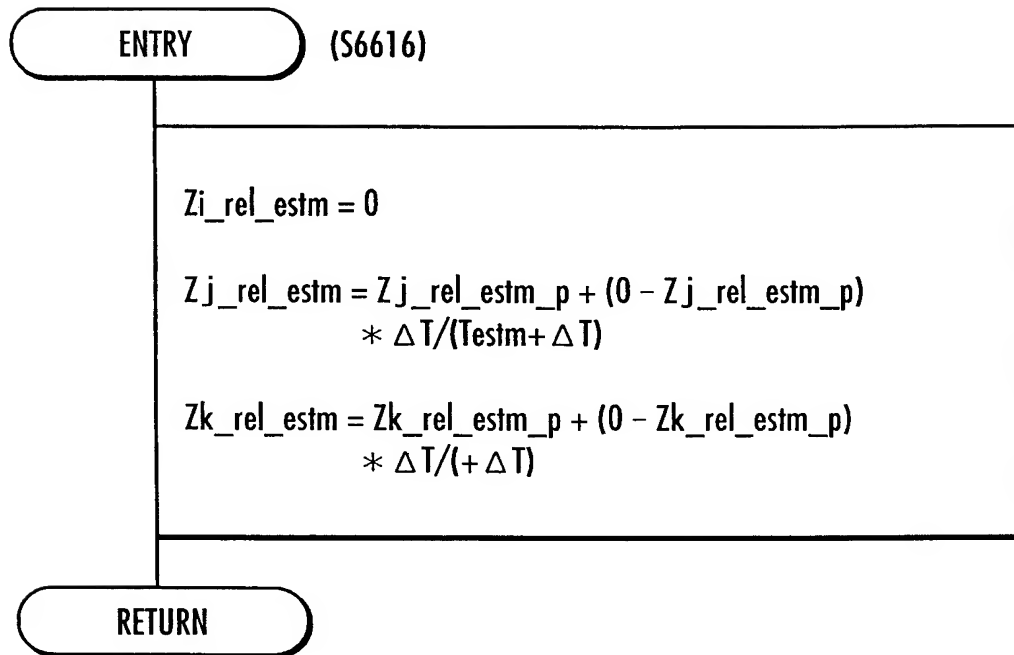
41 / 55

FIG.53



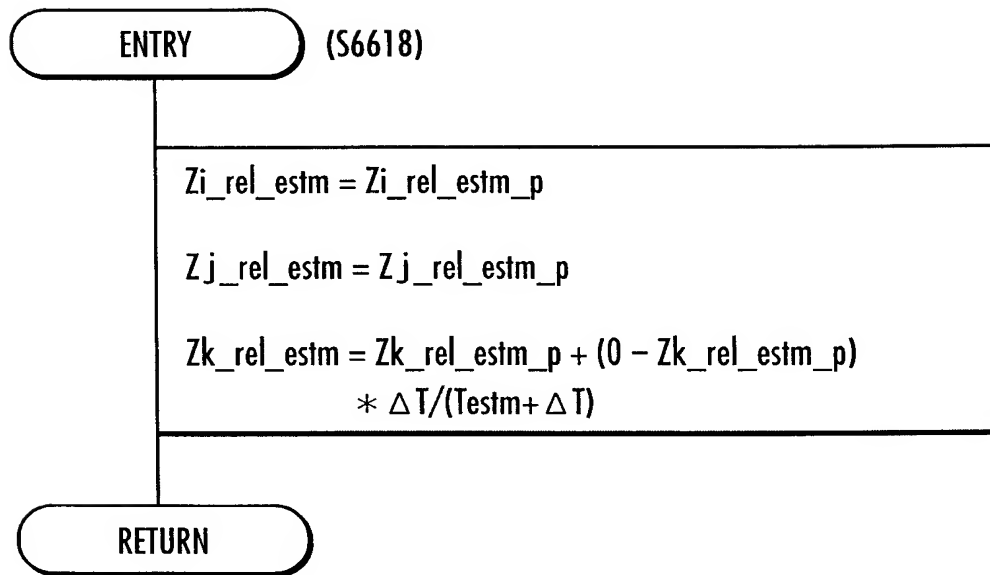
42 / 55

FIG.54



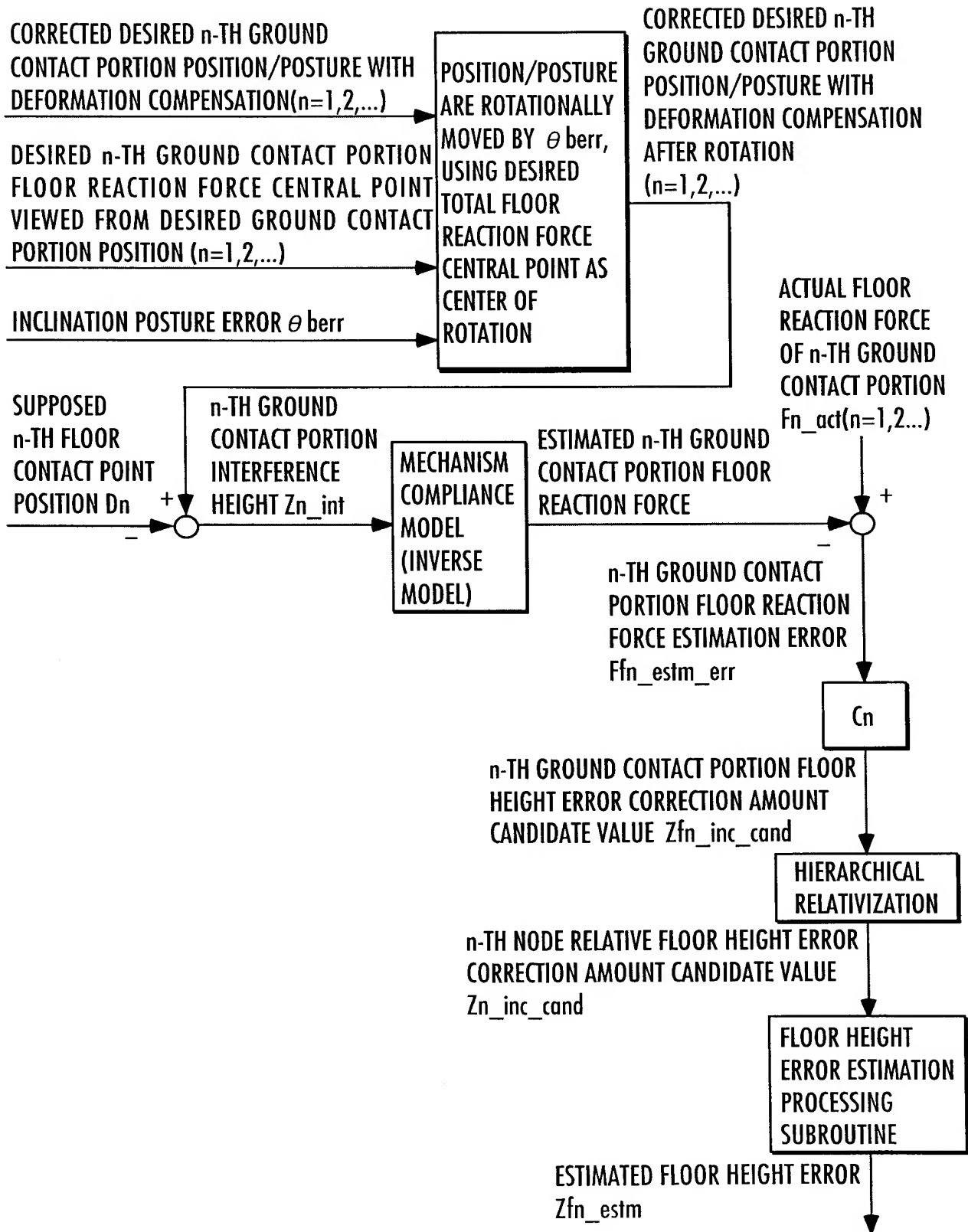
43 / 55

FIG.55



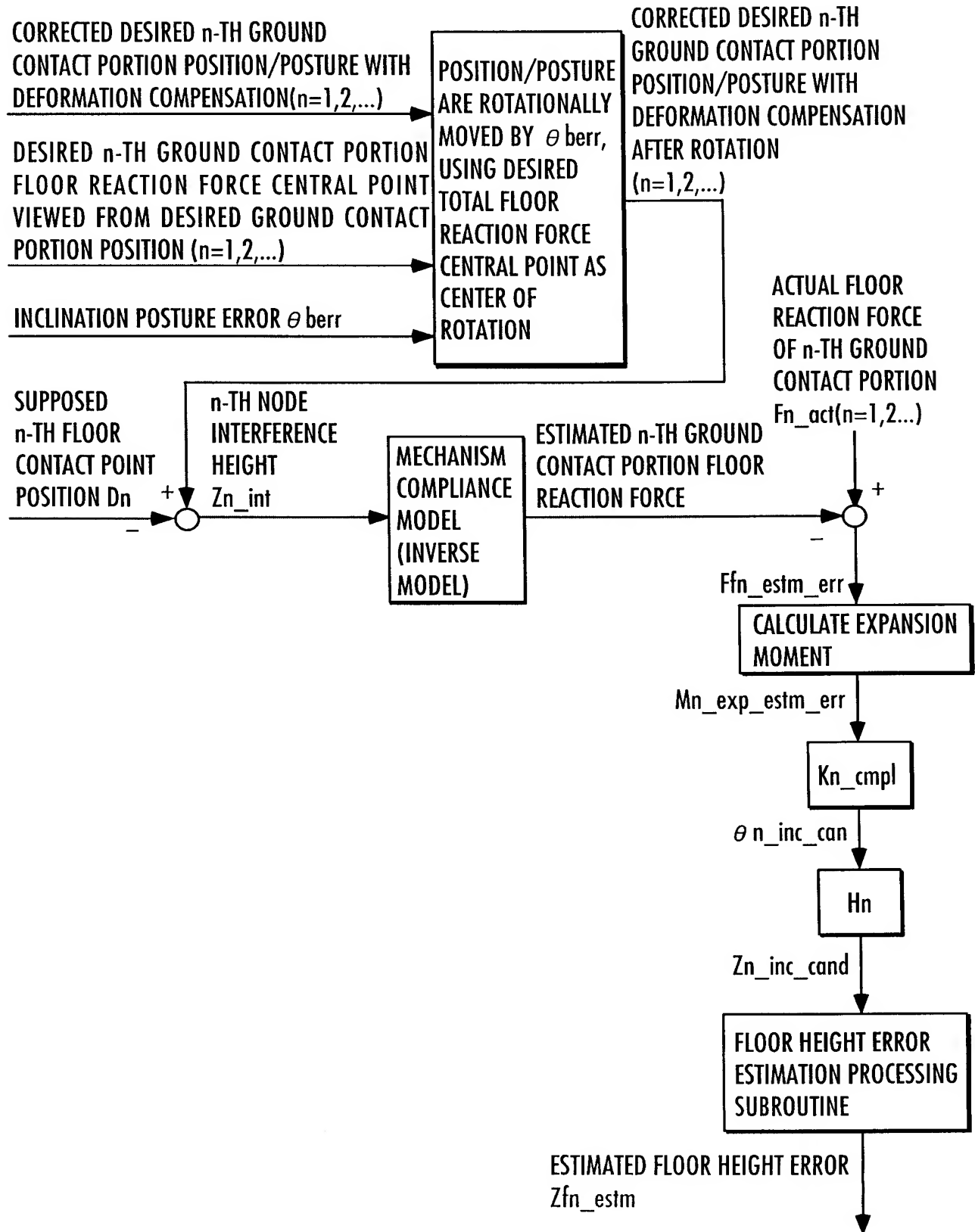
44 / 55

FIG.56



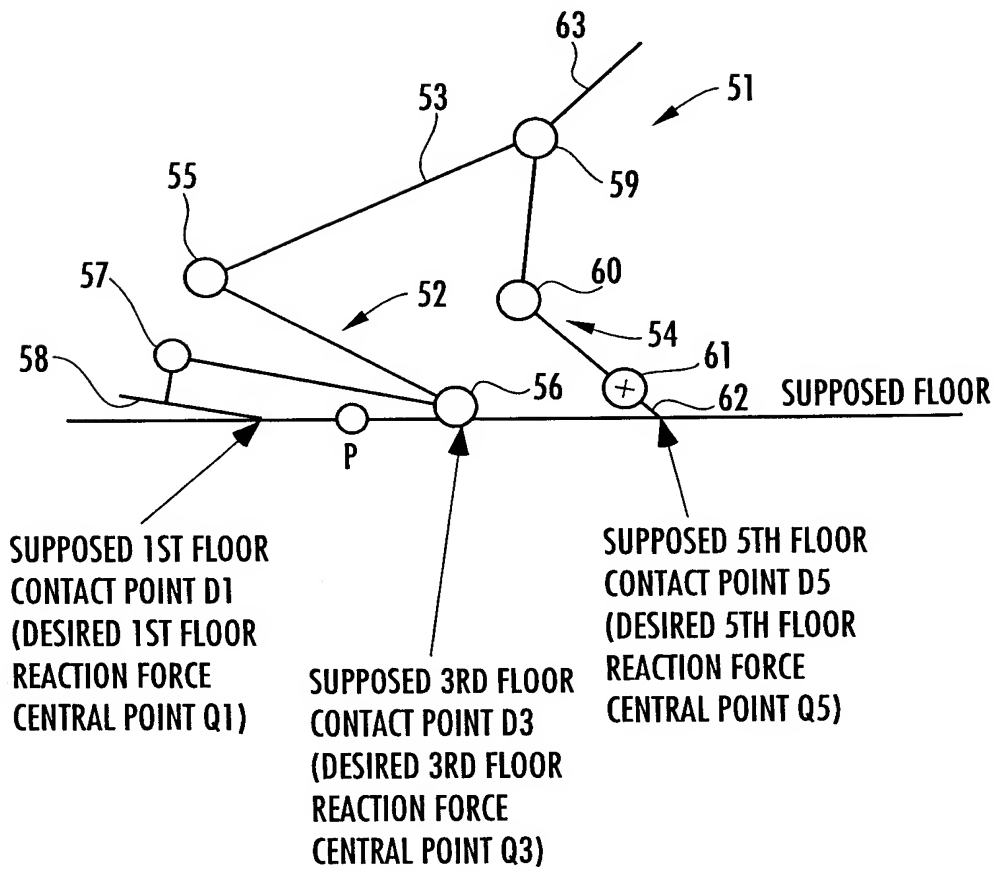
45 / 55

FIG.57



46 / 55

FIG.58



47 / 55

FIG.59

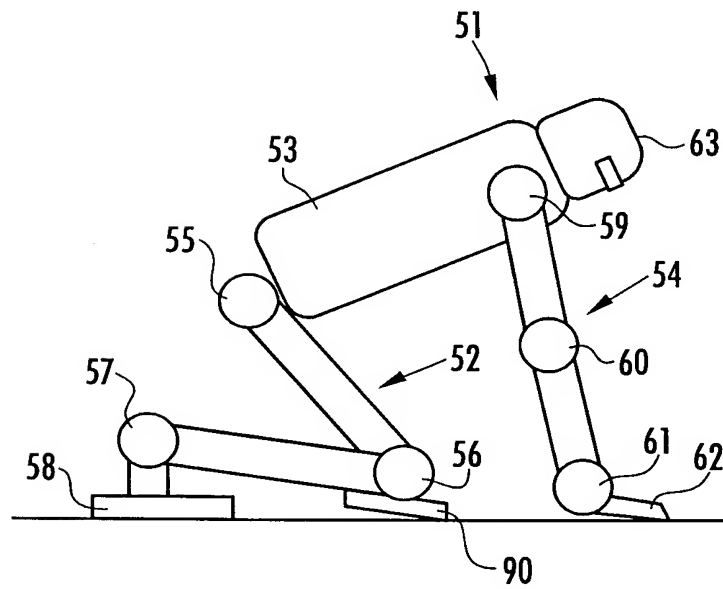
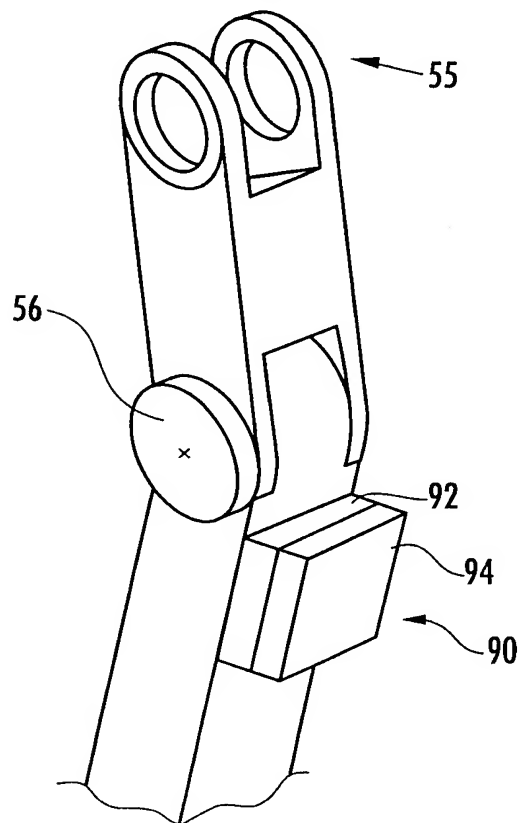


FIG.60



A schematic diagram of a human figure model, oriented horizontally with 'LEFT' at the top and 'RIGHT' at the bottom. The model is represented by a series of circles (joints) and diamonds (limbs). The joints are labeled Q1, Q12, Q2, Q3, Q4, Q5, Q56, Q6, and P. The limbs are labeled 58 and 62. The 'FOOT' is indicated by an arrow pointing to the left side, and the 'HAND' is indicated by an arrow pointing to the right side. The 'KNEE' is indicated by an arrow pointing to the joint between Q3 and Q4. The 'LEFT' and 'RIGHT' directions are indicated by arrows at the top and bottom respectively.

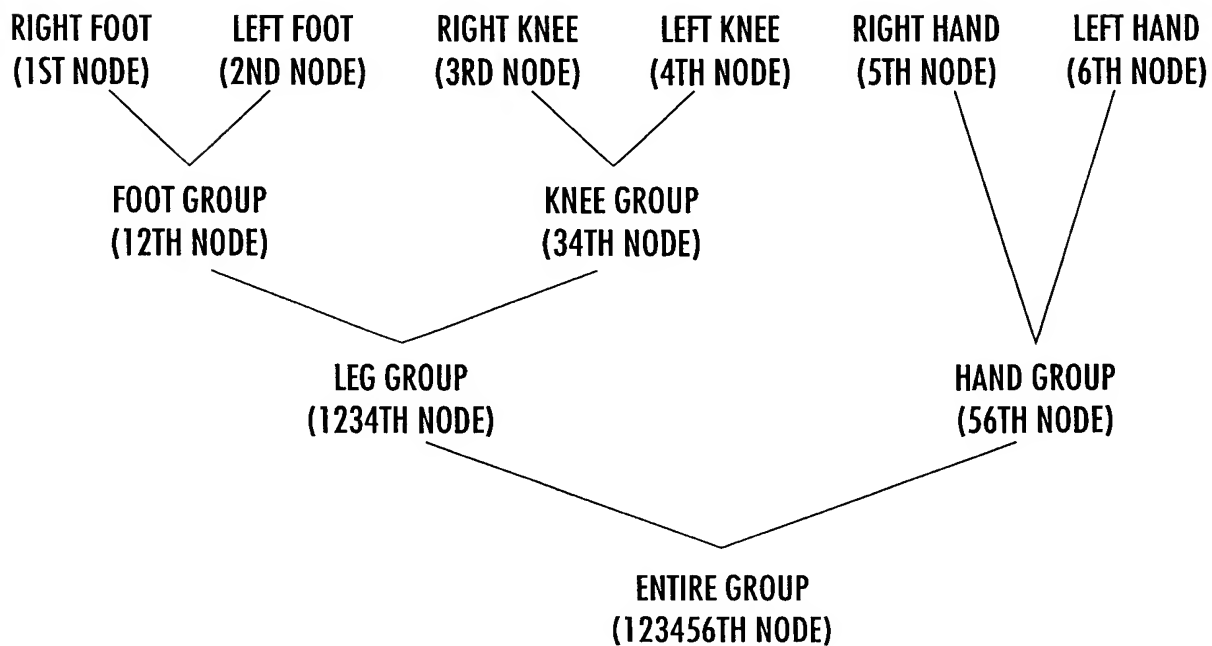
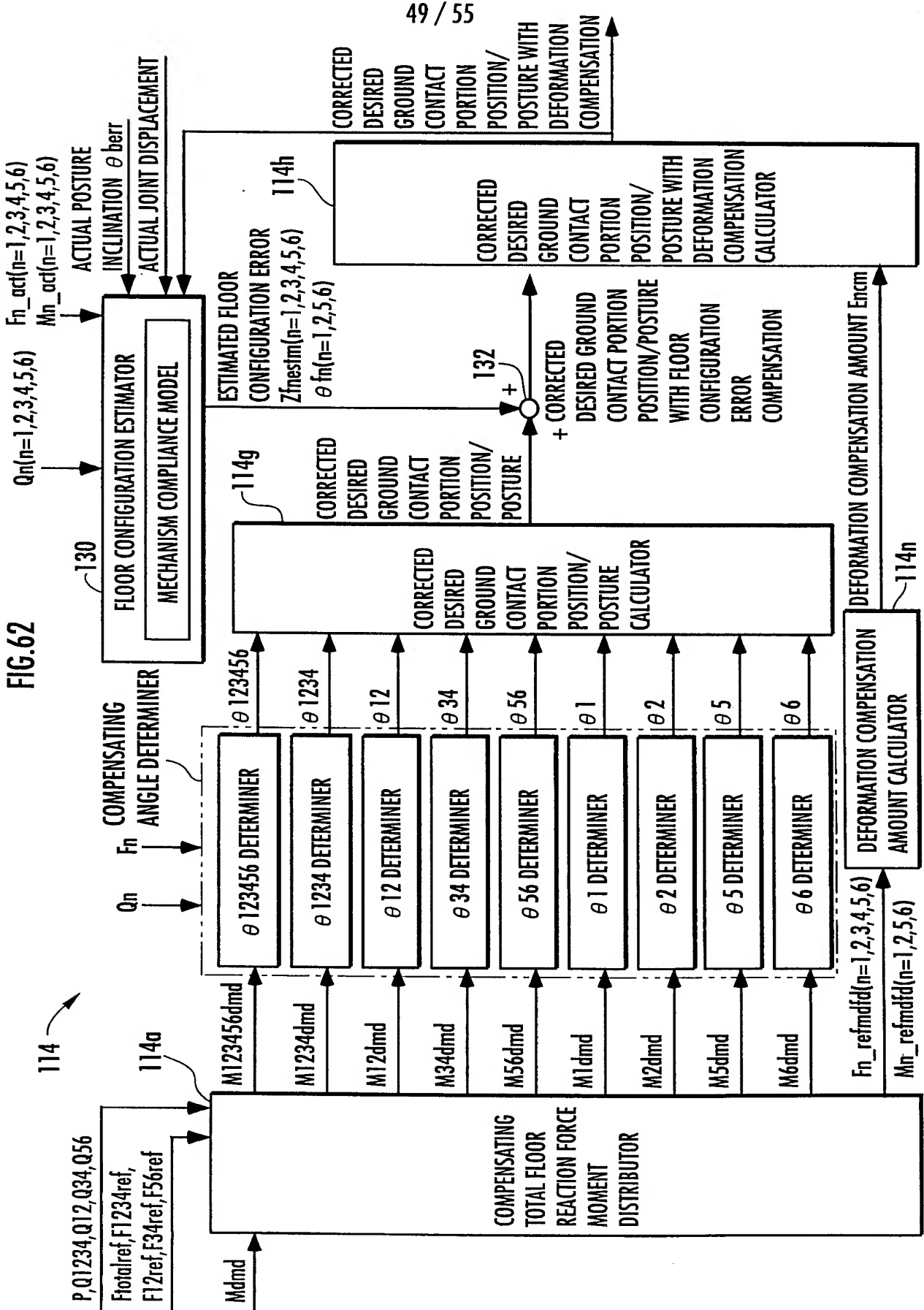




FIG. 62



50 / 55

FIG.63(a)

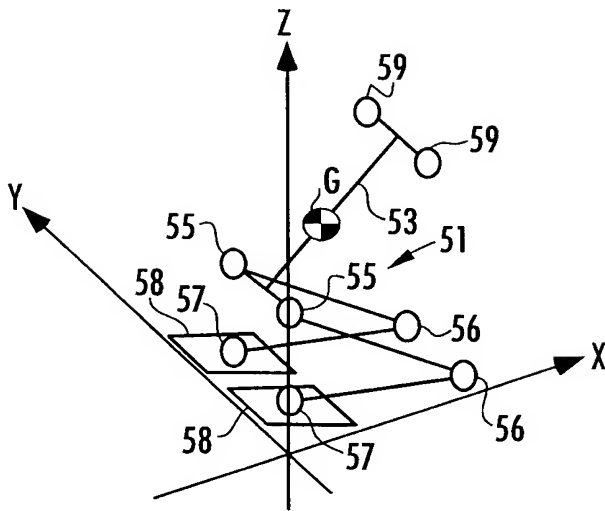


FIG.63(b)

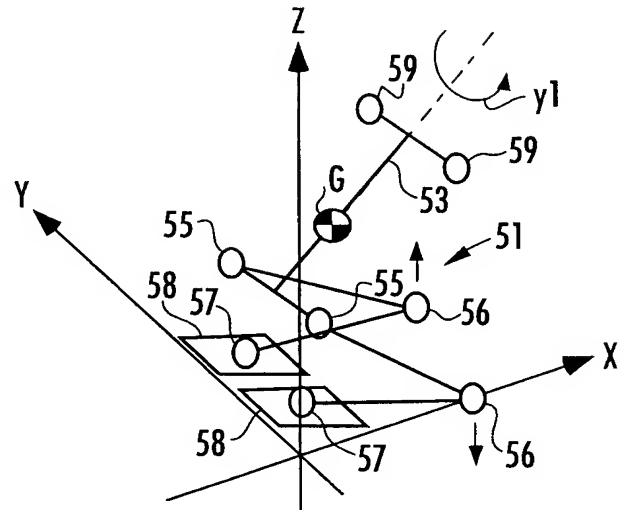
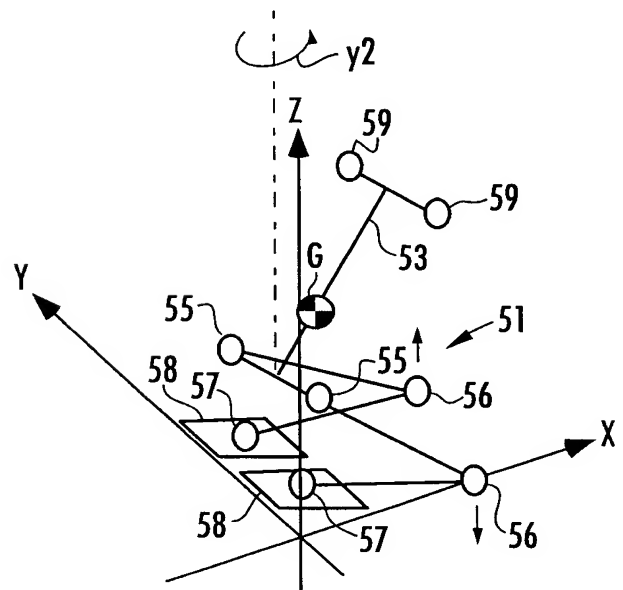
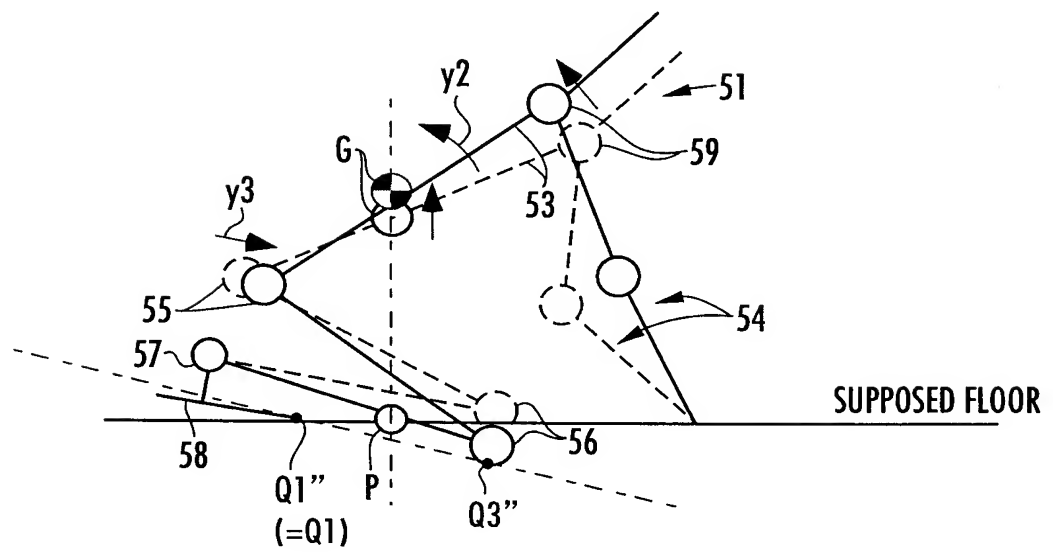


FIG.63(c)



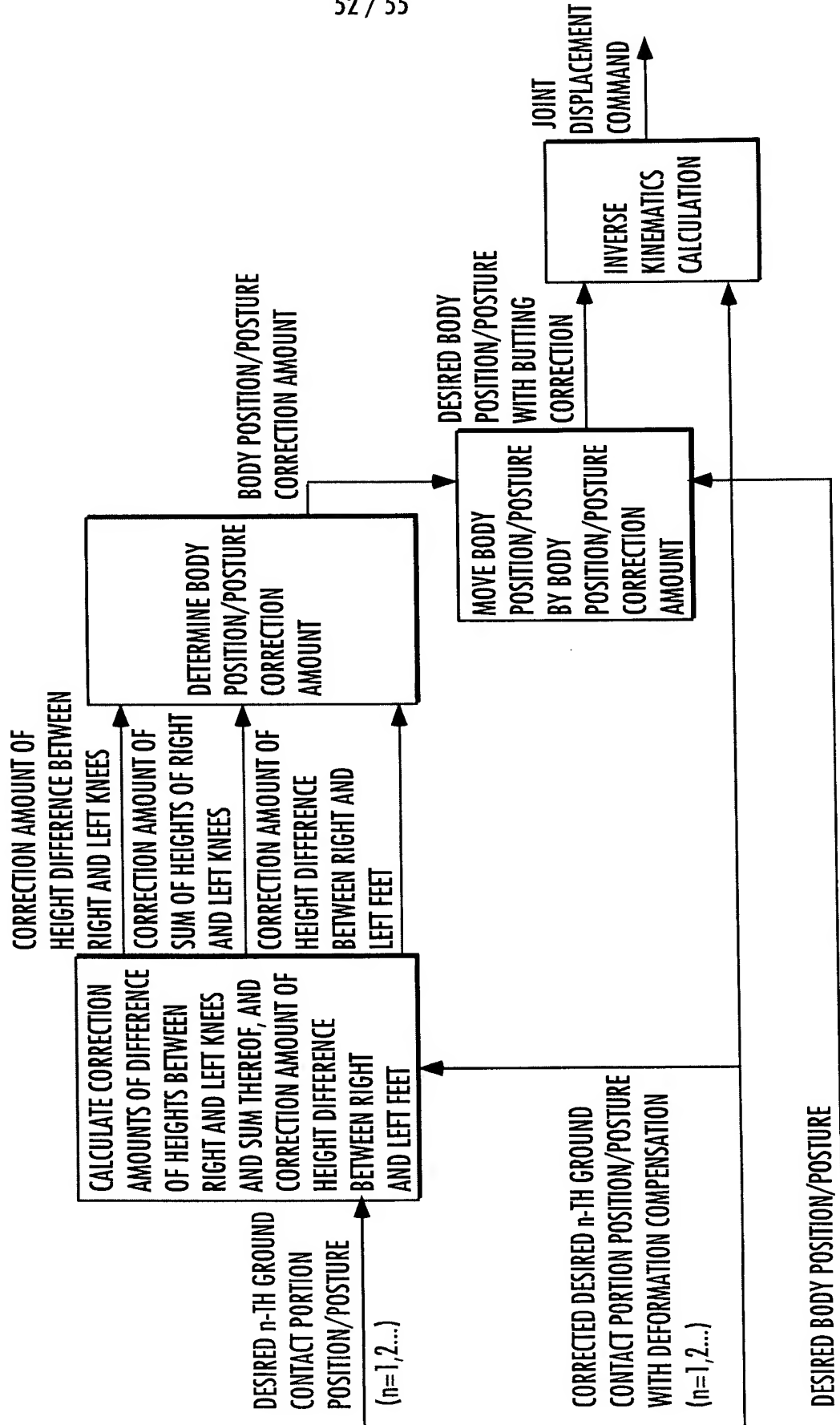
51 / 55

FIG.64



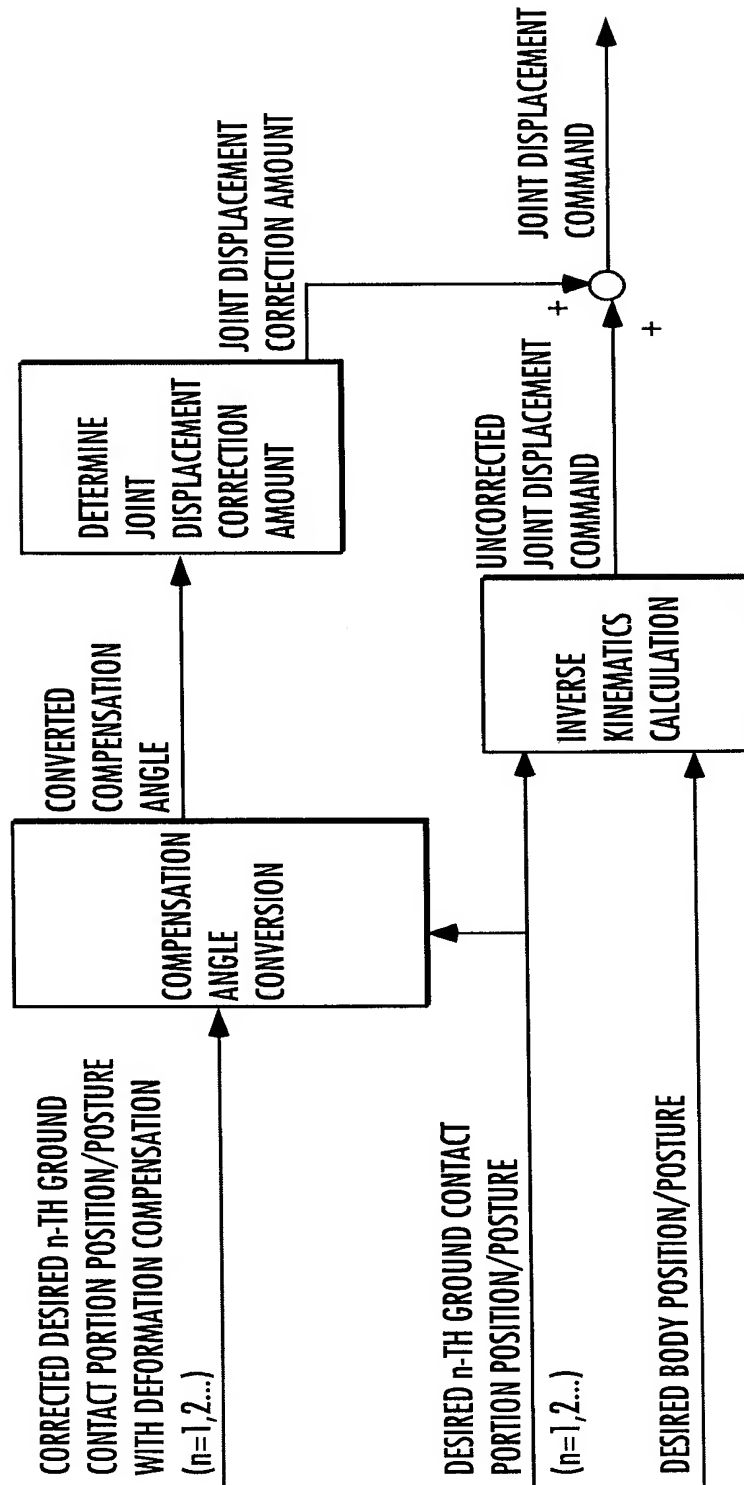
52 / 55

FIG.65



53 / 55

FIG.66



54 / 55

FIG.67

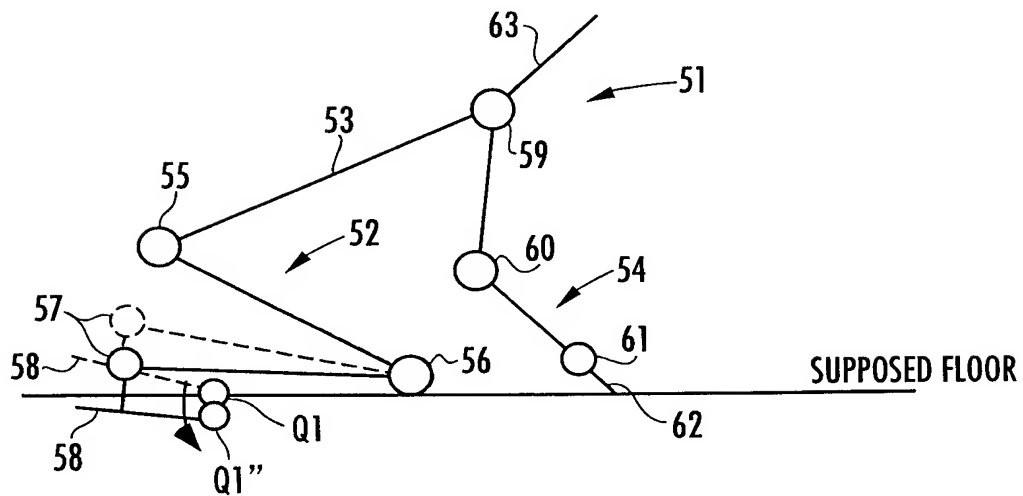
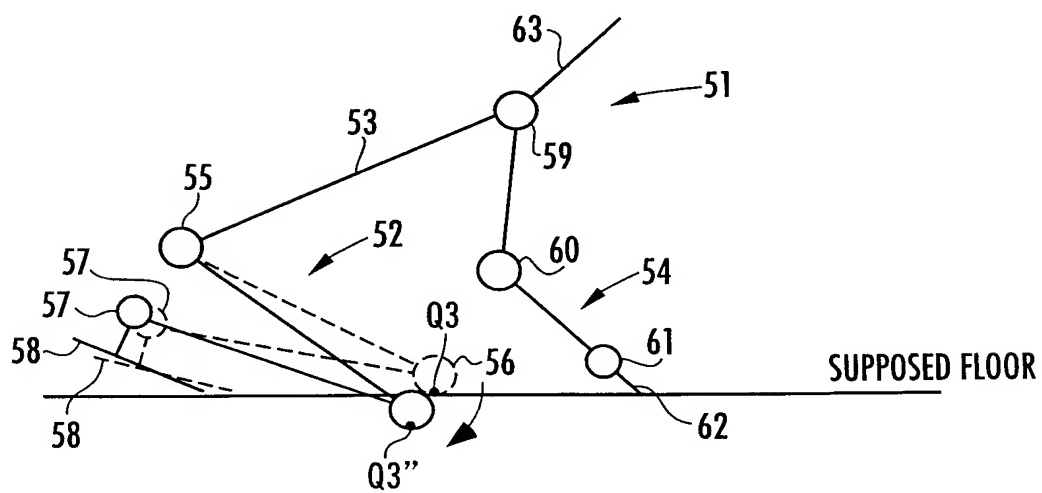


FIG.68



55 / 55

FIG.69

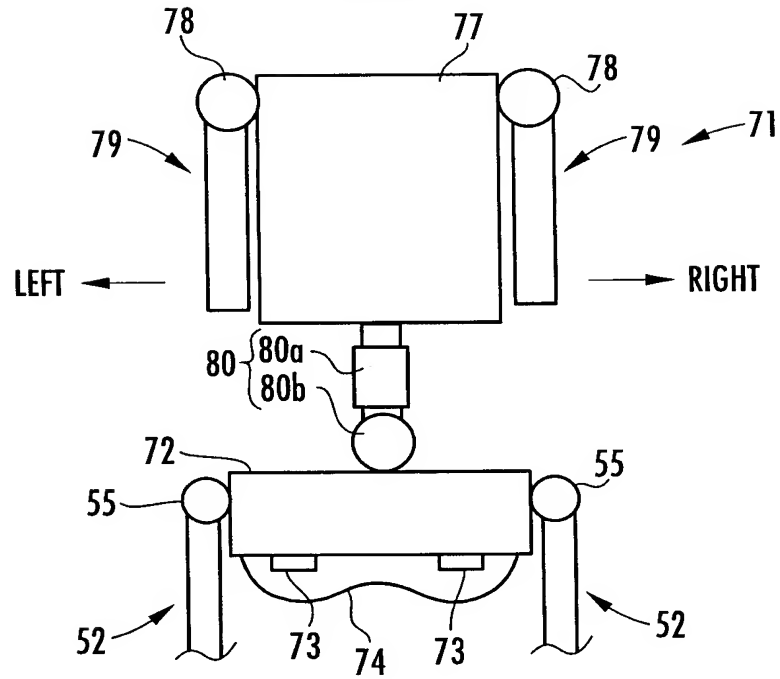


FIG.70

